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REPORT

ON

THE CONDITION OF TROPICAL AND SEMI-TROPICAL FRUITS

IN THE

UNITED STATES

IN

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ERRATA.

Page 5. There is subsequent and reliable information that "Satsuma" plum is not native in the province of Satsuma, Japan, but farther north.

Page 52. The foliage of *Carica Candinamarcensis* should be said to resemble that of *C. papaya*, and not that of the "ordinary papaw of the north."

Page 71. Sustain orange should be described as "having the navel mark."

Page 79. Kin-Kan—The description should read, "A highly esteemed variety from Japan."

Page 129. See report for 1884 of the Agricultural Department of the University of California, instead of "Report of the California Hort. Com. of 1887." *Lecanium*, not "*Secanium*."

LETTER OF SUBMITTAL.

SIR: The following reports upon the history and condition of tropical and semi-tropical fruits within the United States, up to and including the present year, are submitted to you and to the public, in accordance with your instructions, after careful investigation of the facts.

It is my sincere desire that this first bulletin issued by the Division of Pomology, may be of service to the fruit-growers of the country.

Very respectfully,

H. E. VAN DEMAN,
Chief of Division of Pomology.

Hon. NORMAN J. COLMAN,
Commissioner of Agriculture.

EXPLANATORY NOTES.

The original paintings from which the accompanying illustrations were made are the work of W. H. Prestele, the artist of this division. They are as nearly exact in size, shape, and color as it was possible to make them from the specimens, and they are in no case exaggerated in any respect.

JAPANESE PLUMS.

Kelsey.—The branches, leaves, and fruit used in making this illustration (Fig. 1, Plate I), came from California and Florida.

The tree is upright in growth, leaves narrow, twigs brownish-gray, resembling those of *Prunus chicasa* more than those of *P. domestica*. It is so productive, that many trees the past year had to be supported to prevent breaking down.

The size of the fruit is from $1\frac{1}{2}$ to $2\frac{1}{2}$ inches diameter. In form it is heart shaped, with a distinct suture on one side from stem to apex. The stem is short, and set in a depression at the larger end of the plum. The colors are mixed yellow and purple, which vary in depth, but rarely make a brilliant appearance, covered with a bloom. The flesh is yellow, very firm, and clings to the stone. The stone is rather small, and nearly always partially surrounded by a cavity, which is shown in the picture. When fully ripe the quality is very good.

In the South, where the winters are very mild and the tree is hardy, this plum is proving a great acquisition. Its firm flesh makes it an exceptionally good shipper, which has been proven by samples sent from California to me at Washington in the same package with other plums. It is not curculio-proof, as some over-enthusiastic persons have stated.

Satsuma.—This plum is another importation from Japan (from the province of Satsuma), and is likely to prove valuable. The only tree old enough to bear in America, so far as heard from, is on the grounds of Luther Burbank, at Santa Rosa, Cal. It bore a heavy crop in 1887, and the illustration (on Plate I) was made from specimens grown on this tree.

The leaves are more lanceolate than those of *Kelsey*. The hardiness of the tree is not yet well tested. The fruit averages about $2\frac{1}{4}$ inches in diameter. The shape is nearly round, and but slightly sutured on one side. Surface dark red, under a thick bloom. Dots rather conspicuous and numerous. The flesh is dark purplish-red, which has caused the

name of "Blood Plum of Satsuma" to be given by some. The stone is very small and pointed.

KAKI, OR JAPANESE PERSIMMON.

There has been so much confusion and lack of knowledge as to the nomenclature of the varieties of this fruit, that I have made extra efforts to procure and examine all the specimens possible from many parts of the Southern States and California. After comparing a great number of specimens with each other and with illustrations of named varieties made in Japan, besides extensive correspondence and personal interviews with some of the principal growers, I feel safe in saying that the identity of a few varieties is established. Three are herewith described and illustrated.

Yemon.—This variety is one of the most common and valuable grown, because of its delicious flavor and productiveness. The name has often been distorted into "Among," and this misnomer is also applied to other varieties. "Seedless" is another synonym for this as well as other kinds. In size it varies from $1\frac{1}{2}$ to 3 inches transverse diameter, by about half that much from stem to apex. The shape is very flat, with distinct and deep furrows running into the deep cavity at the stem, and shallow ones meeting at the opposite end, where a slight depression usually occurs. Most specimens are four-sided. The color is bright orange-red. The external appearance is much like that of a Trophy tomato. The flesh is so soft, that when fully ripe it is best eaten with a spoon, and of an unmixed orange-red color. Seeds are almost if not entirely wanting. The flavor is very sweet when soft, but astringent when hard. In season it is early, and does not require frost to ripen it.

Hachiya.—Sometimes spelled "Hachija." One of the largest of all kinds; often 3 to 4 inches in diameter, and rare specimens have weighed 20 ounces. The shape is oblong-conic, but tapers rather abruptly at the apex. Generally quadrangular. Color a dull orange, with more or less dark specks, and very small and faint reddish streaks towards the apex. The flesh is quite firm, and of a brownish-yellow color flecked with dull red. Owing to its solid character this variety is largely used for drying in Japan. Ripens rather late, and sometimes has several seeds, which are always very long and slender.

Tane-nashi.—This is a variety of superior excellence for eating from the hand, for drying, and making marmalade, etc. Size medium to large, about 3 inches in both diameters. Form conical, heart-shaped, very symmetrical, not furrowed or ribbed. Stem cavity usually deep. Skin very smooth and translucent, clear reddish-orange, covered with a delicate bloom. Flesh tender, melting, about like jelly, clear orange-yellow, not stringy or streaked. Flavor not so sweet as some, but very rich and pleasant. Almost or entirely seedless.

H. E. VAN DEMAN,
Chief of Division of Pomology.



FIG 1 KELSEY.



FIG 2 SATSUMA.



FIG 1 HACHIYA.



FIG 2 TANE-NASHI.



YEMON.

TROPICAL AND SEMI-TROPICAL FRUITS IN FLORIDA AND THE GULF STATES.

SIR: I have the honor to submit the following report on the "Condition of cultivated Tropical and Semi-tropical Fruits in Florida and the Gulf States."

My observations, necessarily, are more especially confined to Florida, not from any desire to detract from the great advantages of our sister States, but on account of greater familiarity with the soil, climate, and products of Florida than with those of the other Gulf States.

The division of tropical fruits, too, will be found to mention fruits whose culture, except under glass, will necessarily be confined to south Florida, and some to the extreme lower keys and main-land of the peninsula. Some fruits will be found mentioned and described that are scarcely yet known in Florida, but are here described to draw attention to their culture, as being likely to be profitable.

It is hoped that the many deficiencies in the preparation of this work will be overlooked.

Our thanks are due for the kind assistance rendered us by Mr. D. G. Watt, of Pinellas, Fla.; Maj. A. J. Adams, Manatee, Fla.; Mr. E. L. St. Ceran, Ponchatoula, La.; Mr. A. H. Manville, Jacksonville, Fla.; Mr. G. L. Taber, Glen Saint Mary, Fla.; Prof. A. H. Curtiss, Jacksonville, Fla.; Mr. W. C. Steele, Switzerland, Fla.; Mr. D. Redmond, Jacksonville, Fla.; Mr. W. A. Marsh, Orlando, Fla.; Mr. A. L. Duncan, Dunedin, Fla., and others.

Much information has also been obtained from the leading nursery catalogues of the South and West; also from standard works.

TROPICAL FRUITS.

PINE-APPLE.

(*Bromelia ananas*, Linn.; *Ananassa sativa*, Lindley.)

So near as we can learn the culture of the pine-apple in Florida was first begun, at least to any extent, by Mr. Benjamin Baker, of Key West, who, about the year 1860, procured slips from Havana, and planted out a small patch, as an experiment, on Plantation Key. The almost fabulous profits realized by Mr. Baker for the first few years soon in-

duced others to plant out more, and so the industry has strengthened, until now it would be a labor of weeks to get reasonably accurate statistics as to the total acreage planted out to this crop in the State.

The cultivation of the pine-apple is, of course, confined to those localities practically exempt from severe frosts, as even a light white frost is detrimental to the growth of the plant. The bulk of the crop is produced on Key Largo, Plantation Key, and upper Matacombe, though there are extensive young plantations on Indian River and on the lower Gulf coast. In Orange and Lake counties, the pine-apple is grown for home use to a considerable extent under low sheds constructed of pine tops or palmetto leaves. General Sanford, at Belair, near Sanford, has more than an acre covered in this manner.

With few exceptions, all the pine-apple plants of the main-land of Florida were killed to the ground by the great freeze of January, 1886, while in many cases on Key Largo and the other keys the leaves of the plants were whitened.

In most of the plantations on the main-land there was practically no crop of fruit produced in the summer of 1886, and of course what few fruits were produced were small, flavorless, and of no commercial value. The crop on the keys was retarded in ripening from one to two months, and the fruit that did ripen was undersized, and fell considerably off in quantity produced.

This year the suckers which sprang from the roots of the old plants (those killed down by the freeze of 1886) have again reached a bearing size, and a good crop is being produced in the protected "pineries" of Orange County, though it is later in ripening than usual. On the keys the crop is fully up to the average, and is ripening as early as in the years past.

The breaking out of the yellow-fever in Key West in May, during the height of the pine-apple-shipping season, completely demoralized the pine-apple market for nearly a month. Most of the fruit is brought from the upper keys to Key West for shipment; almost every planter owning and running one or more schooners.

At the first breaking out of the fever, withdrawal of steamers and absurd quarantine regulations, etc., completely stopped the shipment of pine-apples, which were then daily arriving in Key West by the schooner-load. These were at first given away to any one who would take them; but finally the authorities became alarmed at the quantity of fruit that was rotting on the wharves and in the streets, and tons of fruit were thrown into the Gulf at their order. By the 20th of June, when the panic had somewhat subsided, shipments were again commenced, but not until after many tons of the fruit had rotted in the fields. Taken altogether, the season has been a most unfortunate one for the pine-apple farmers of the keys.

The amounts realized from the sale of pine-apples have of course diminished as the industry became well established, and the high prices

obtained by the first cultivators of the fruit have become a thing of the past. The farmers of Key Largo claim that a fair profit is made when they can sell their fruit in Key West at 5 cents each. In June of this summer pine-apples were selling on upper Matacombe and Key Largo at 25 to 50 cents per dozen for Red Spanish, \$1.20 per dozen for Sugar-loafs, and 50 cents apiece for Porto Ricos. Tons of the fruit had rotted in the fields, but shipments have again been resumed.

The soil on these keys, wherever the pine-apple thrives the best, consists of nothing but a very thin stratum of leaf mold, produced by the decayed leaves of the natural forests, underlaid by coralline rock, which, indeed, is frequently not covered by any soil at all. A new clearing is made every year, brush and logs are burned, and the land set out to "slips," without any previous digging or cultivation whatever. It is impossible to use either hoes, plows, or any of the ordinary agricultural implements on account of the ever-present rock. The slips are stuck in at random, from 18 inches to 3 feet apart, wherever a niche in the rocks will accommodate them, or where enough soil can be scraped around the base of the slip to keep it from falling over. They never receive any further cultivation than the pulling of weeds by hand; a difficult and disagreeable employment when the plants become of any size, owing to the sharply-serrated leaves of the plants.

The planting is usually done in July or August, and the first crop of fruit produced the second spring after (about eighteen months from the date of planting.)

When "suckers" are planted, a small crop of fruit is produced in the following spring or summer. The pine-apple on the keys usually blossoms in January or February, perfecting the main crop of fruit from April to June.

At about the time of the first planting of the pine-apple slips the same clearing is also planted out in some tropical fruit-trees, usually limes, alligator-pears, sugar-apples, or sapodillas, 15 or 20 feet apart, and in five or six years, when the pine-apple plants have appropriated the most of the strength of the soil and have become no longer worth the trouble of weeding, the fruit trees have become of a bearing age, and produce fruit for a number of years in great profusion, but of small size and comparatively poor quality.

In ten or twelve years from the time of the first planting the pine-apple plants are usually entirely dead, and the ground occupied by the trees, while the pine-apple fields encroach each year on the virgin forest lands.

On Indian River and the Gulf coast the pine-apple is grown on the ordinary sandy soil peculiar to south Georgia and Florida with good results. Commercial and home-made fertilizers are applied with benefit. Here the plants are usually set out in rows 2 by 2 or 2 by 3 feet, and given thorough cultivation.

The plants are known as "crowns," "slips" or "sets," and "suckers."

The crowns or tops are cut or twisted from the top of the fruit. Occasionally a dozen or more little shoots appear around the base of the crown, called crownlets. In the case of scarce varieties these also are planted, making as good plants in the end, though taking a longer time. The slips are the shoots from around the base of the fruit. These are ordinarily planted. Each fruit spike produces from five to twelve slips. When the pine-apple is ripe it is cut just above the slips, leaving the slips on the stem. The slips continue to grow, and are usually left on a month or more after the fruit is removed to attain larger size before planting. The crowns and slips produce their first crop the second season after planting. By the term "suckers" is understood the shoots appearing near the root of the plant, which are the largest of all. These produce a light crop of fruit the first season after planting, but are not regarded as producing so healthy plants as the slips. The crowns are rarely sold, except of the choice varieties. The slips of the common Red Spanish variety are worth on the lower keys from \$4 to \$6 per "hundred dozen" (all counting is done in Bahamian style). On the Gulf coast and on the Upper Indian River they sell for \$10 to \$15 per thousand. Suckers are worth about twice as much.

Owing to the prevalence of mosquitoes on the keys, and the rough rocky character of the soil, no horses or wagons can be employed, and although there are plantations of one or two hundred acres in extent, and pine fields sometimes half a mile from the wharves, all fruit and slips are carried in large Cuban-made baskets, usually on the heads of negroes. Colored labor is employed to a considerable extent, usually from Bahama.

It seems to me that one great furtherance of the future profitable production of pine-apples on the keys would be the establishment of lines of coasting steamers of light draught, by which means the fruit could be distributed up along the Atlantic and Gulf coasts at various ports, where West Indian fruit is rarely landed, and by this means reaching many southern localities where at present a pine-apple is almost an unknown fruit. At present, except small quantities of fruit carried by coasting schooners up along the Florida coast, the entire crop of the keys goes to New York to compete with West India fruit and the fruits of the world.

It would seem to me also that if a more intensive system of cultivation could be inaugurated on the keys, it would be much better than the rather "slip-shod" manner of cultivation now practiced. If parties would cultivate smaller areas, planting out only the choicest varieties of pine-apples, and cultivating and fertilizing in the best possible manner, the proceeds would be more satisfactory. Fancy fruit, put up in a neat and attractive manner, will always command fancy prices. The pine-apple is a good shipper for a tropical fruit, the common varieties undergoing rough handling, and frequently, if cut when "full" but not yet yellow, keeping as long as three weeks.

The only work known to us on the culture of the pine-apple in Florida, for those who intend to plant this fruit, is an able treatise, which has been published from time to time in the Florida Dispatch (of Jacksonville, Fla.), by Rev. James H. White, of Merritt's Island, Indian River. We believe it has not been published in pamphlet form.

As far as our knowledge extends, the only insect enemy which the pine-apple has in Florida is a scale insect, which seems to be identical with the "white mealy crimson-tinged insect" of Speechly. The scientific name of this scale is *Dactylopius adonidum* (Linn). Although found to some extent on pine-apple plants everywhere, it seems to do no serious damage when the plants are kept in a healthy growing condition. It infests the roots, leaves, fruit, and every part of the plant. Speechly gives a remedy (Vine and Pine-apple Culture, p. 321) for destroying this scale in the English hot-houses, but we do not think it ever does serious damage to healthy growing plants in Florida.

VARIETIES.

The principal variety in cultivation in Florida is the Red Spanish, also known by the names Black Spanish, Scarlet Key Largo, Havana, Cuban, Strawberry, etc. Probably nine-tenths of the pine-apples produced in Florida are of this variety. It is the ordinary pine-apple of export; fruit short, somewhat tun-shaped or bulging in the middle, ruddy yellow when ripe, protuberances generally swelled very large. Flavor subacid, sparkling; a good fruit when well ripened.

Green-leaved Sugar-Loaf.—Fruit of pyramidal shape. At first pale green, but when near ripe changing to a fine yellow. Flesh firm, deep yellow, sweet, and of exquisite flavor. Grown to some extent on Key Largo.

Porto Rico.—Plant very large and strong-growing, attaining a height of 3 to 4½ feet. Fruit very large, attaining a weight of from 6 to 15 pounds, according to cultivation and location. Protuberances very large; flavor subacid and delicious. Grown to a slight extent on Key Largo.

Of the following additional list of varieties some are in cultivation in the "pineries" of middle Florida and on Indian River:

Anson's.	Blithfield Orange.
Antigua Queen.	Blood-red.
Black Ripley.	Downton Havana.
Black Antigua.	Egyptian Queen (a favorite of Indian
Bird's Eye (cultivated to some extent	River cultivators).
on Indian River).	Enville Queen.
Black Jamaica.	Enville.
Buck's Seedling Globe.	Fisherwick Striped Globe.
Brown-leaved Sugar-loaf.	Green Antigua.
Brown Sugar-loaf.	Green Java.
Black Sugar-loaf.	Green Providence.
Buck's Seedling.	Globe.

Green Queen.
 King.
 Lemon Queen.
 Lord Bagot's Seedling.
 Lady Beatrice.
 Lord Carrington.
 Montserrat.
 Moscow Queen.
 Mealy-leaved Sugar-loaf.
 New Demara.
 New Enville.
 Orange Sugar-loaf.
 New Jamaica.
 Otaheiti.
 Prince Albert.
 Providence.
 Queen.
 Rough or Spine-leaved Cayenne.
 Ripley.
 Russian Globe.
 Russian Coxcomb.

Ripley's Queen.
 Scarlet Queen.
 Smooth Cayenne.
 Smooth Havana.
 Striped Smooth-leaved Sugar-loaf.
 Striped Surinam.
 Sierra Leone.
 St. Vincent.
 Surinam.
 Striped-leaved Sugar-loaf.
 Striped Queen.
 Silver-striped Queen.
 Trinidad (Pitch Lake).
 Thompson's Smooth Cayenne.
 Trooper's Helmet.
 Spring Grove Enville.
 Welbeck Seedling.
 White Ripley.
 Wave-leaved.
 White Providence.

It is worthy of mention, in connection with their cultivation on the keys, that but a part of the crop of pine-apples is considered marketable, as all "pines" with a girth of less than 12 inches (diameter of a little less than 4 inches) are rejected by the buyers and shippers as unfit for shipment.

SAPODILLA, SAPODILLA PLUM, OR "DILLY."

(*Achras sapota*, Linnæus; *Sapota achras*, Miller.)

The sapodilla grows and fruits to perfection in the southern coast-belt of Florida, more particularly on the keys. It has been grown in Key West for many years, where it is now one of the principal fruit-trees in cultivation.

The tree is low and spreading, rarely growing to a height of more than 20 feet, though with a spread of 25 feet or more. The leaves are oblong-lanceolate (about the size of an apple leaf or a little larger) and exceedingly thick and glossy; the flowers are small and insignificant; the fruit, which is produced throughout the year, is usually of the size, shape, and color of a Russett apple, with the taste of a rich, juicy pear, combined with granulated sugar. The sapodilla tree, like many other sapotaceous trees, yields gutta-percha. The fruit, if picked green, will stand shipment, but will not keep the delicious flavor peculiar to it when ripened on the tree. It is probable that with the modern improved system of refrigerators the sapodilla could be shipped in perfect order to the northeastern seaports, and even to interior points, as a consider-

* This celebrated variety is grown in great perfection by General Sanford and other Orange County growers. The slips are worth in Orange County about \$10 per dozen. Fruit of this variety is produced occasionally during winter, and of course brings exceptionally high prices when shipped at that season.

able trade is developing in the transportation of most delicate tropical fruits in improved refrigerator ships between British West Indies (and even British Guiana) and London.

The cultivation of the sapodilla in the Gulf States is confined strictly to south Florida. The sapodilla will bear as much or more frost than the ordinary guava, but on account of extreme slow growth it will not recover from the effects of cold weather so soon nor so surely as the guava. Its cultivation, therefore, will be limited to the main-land and keys of south Florida below Charlotte Harbor and to those regions north of this that are protected naturally by bodies of fresh or salt water. This will include localities on the main-land along both the east and west coasts, the keys and Islands, up to Tampa Bay and Cape Canaveral, and a few favored locations in the lake region of Polk, Orange, Sumter, and Lake counties. Previous to the freeze of January, 1886, the sapodilla produced fruit as far north as Tampa, and on the Manatee River half a dozen trees were fruiting. The freeze of that year (1886) killed to the ground most of the sapodilla trees growing north of Charlotte Harbor, while below the Caloosahatchee River they were injured none or but little.

Mr. Samuel Litchfield, of Manatee, had growing on his place three fine trees nine or ten years old which had been bearing several years, and one of which had produced specimens of over a pound in weight which is an unusually large size. At the time of the freeze Mr. Litchfield kindled a fire on the north side of these trees at dark, which was kept burning until 2 o'clock. In despair of saving the trees the fire was then allowed to die out. The trunk and lower branches (with leaves) of the best tree were saved intact. The tree has again produced a light crop during the past summer, and has almost regained its original head of foliage. It is probable that had the fire been kept up, all the trees, at least the trunks and lower branches, might have been saved. Vigorous shoots soon appeared from the roots of the two other trees, which are again fast forming trees.

A valuable precaution in the case of the sapodilla, and nearly all tropical trees growing in regions liable to occasional frosts, is the banking up of earth, in the fall, at the lower part of the trunk of the tree, in which case, if frozen down, enough of the trunk may be saved from which sprouts will spring; or, better still, on occasion of an anticipated freeze, the placing of bottomless barrels or boxes around the trunk and filling the intervening space with earth. In this latter way the trunk and lower branches may often be saved.

The planting of the sapodilla on an extensive scale will doubtless be confined to regions south of Charlotte Harbor, where serious frosts rarely occur.

Among the most healthy and best sapodilla trees in Florida are those of Mr. Collier, at Marco. These trees were not injured in the least by the freeze of 1886, though the thermometer sunk to 28° F., and many

other tropical trees were injured to a greater or less extent. There are several fine orchards of sapodilla trees in Key West, and nearly every yard contains from one to half a dozen trees, some of them very old. Mr. Vincent Pinder, of Boca Chica, has a large orchard of sapodillas, and on Key Largo there are many acres of them, planted in the old worn-out pine fields. The trees, however, on Key Largo and Plantation Key are much less healthy and productive than those at Marco and Key West, owing to the scantiness of the soil and lack of proper fertilizing. The kind produced on the key finds a ready market in Key West.

VARIETIES.

As the sapodilla is propagated altogether from seed, and there is a great difference in size, shape, and quality of the fruit, as well as in manner of growth of the trees and shape of the leaves; but the only well-marked varieties seem to be the round-fruited and oval-fruited, which do not differ essentially in taste.

MAMMEE SAPOTA.

(*Lucuma mammosa*.)

The mammee sapota is a native of the forests of Central America and the West Indies. It is a tree of gigantic dimensions when full-grown, and is also known as the marmalade tree, or marmalade-box. The tree is evergreen, with very large leaves, much resembling those of the loquat—*Eriobotrya Japonica*. It produces large, brown, oval fruits, from the size of a goose egg to that of a musk-melon. A thin, rough, leathery rind surrounds the pulp, which is of a bright-red color, and incloses one to three very large glossy-brown seeds, which extend nearly the whole length of the fruit. The fruit is sliced, and eaten like a musk-melon, but without salt. The taste is very much like that of a rich pumpkin pie, and the fruit is much appreciated in the tropics. The Cuban fruit retails at about 40 cents per dozen in Key West. There are many young trees in south Florida, but we know of none bearing, though there are possibly some on Key Largo. So far as we know there is nothing to prevent the culture of this fruit wherever the sapodilla can be grown, as it seems to be as hardy as the sapodilla, and to sprout from the root much more readily when killed back by frost. The fruit will stand shipment of a week or more.

WILD SAPODILLA.

(*Mimusops Sieberi*.)

This tree is found native on the lower keys, where it attains a height of 40 feet, and a stem-diameter of from 1 to 2 feet. The foliage is not unlike that of the cultivated sapodilla, and the small, berry-like fruit is of delicious taste, and most appreciated by those who live on the keys.

It is a fruit, together with many other neglected tropical species, undoubtedly worthy of test-cultivation with a view to the improvement of the fruit.

EGG-FRUIT.

(*Lucuma rivicosa* var. *angustifolia*.)

This fruit is known as "Ti-ess" in Key West, as "Caniste" or "Canistel" in Cuba, and as "Tomot" or "Cancilla" locally on the west coast. It is still a rare tree (a native of tropical America), and in Florida yet but little cultivated. Previous to the "freeze" a specimen had been growing in Tampa for many years, which, after many discouragements by frost, finally produced fruit a few years ago. A large tree is growing at Marco, which seemingly had perfect blossoms every year, but has never yet perfected fruit. Occasional specimens may be seen on the keys.

The tree is a beautiful evergreen, with glossy leaves, smaller, but bearing a family resemblance to those of the mammee sapota.

The fruit is a "small edition" of the mammee sapota, with pulp tasting like a hard-boiled egg. The fruit always sells well in Key West, and the tree might be more generally cultivated with profit, as it is fully as hardy as the sapodilla and other of its congeners. So far as we know, the tree and all of its congeners of the family Sapotaceæ are entirely without insect enemies.

STAR-APPLE.

(*Chrysophyllum cainito*.)

Here we have another sapotaceous tree, as yet not often planted in Florida, except on the lower range of keys. A description of the foliage is best given in the few enthusiastic words of Charles Kingsley: "And what is the next, like an evergreen peach, shedding from the under side of every leaf a golden light—call it not shade? A star-apple."

The star-apple tree ultimately attains a height of 30 feet, and is a profuse bearer. The fruit is of the size of an apple, though nearly as smooth and round as a billiard ball. They ripen in April and May. When cut into halves transversely the fruit discloses a greenish or purple pulp, with whitish, star-shaped "core," containing from four to ten brown seeds as large as pumpkin seeds.

Picking when green destroys the flavor; when ripened on the tree they are sweet and good, most people liking them at first taste. In Jamaica, a mixture called "matrimony" is made by scooping out the inside pulp and putting it into a glass with the juice of a sour orange. Star-apples are worth from 15 to 30 cents per dozen in Key West, and there is a good demand. When small, the tree is not apt to sprout up again if killed back by frost, and is perhaps somewhat more tender than the sapodilla. There are two principal varieties, the Purple, of

which the skin and entire pulp are bright purple, and White, which has a greenish-white skin and pulp. This variety is often of larger size than the purple, sometimes attaining a diameter of 4 inches in the West Indies. In taste there is but little difference between the two varieties.

SATIN-LEAF.

(*Chrysophyllum oliviforme.*)

This is a native of the West Indies, and is sometimes found on the lower Florida keys. It was discovered here, botanically, by Dr. Chapman, while collecting the woods of Florida for the centennial exhibit. It is a magnificent evergreen shrub, even more beautiful than the star-apple. The fruit is of but little value until improved by cultivation.

SUGAR-APPLE, OR SWEET-SOP. †

(*Anona squamosa.*)

Few fruits are more popular than this in extreme south Florida, where it is grown to a considerable extent. All the bushes north of Charlotte Harbor that were not thoroughly protected were killed to the ground by the freeze of 1886, but many sent up vigorous healthy sprouts again. The specimens at Marco were practically unharmed, owing to their large size and healthy condition.

The fruit is of the shape of a pine cone, three or four inches in diameter, and is of a yellowish-green color when ripe, and covered with small scaly protuberances much resembling those of the pine-apple, whence the name *squamosa*—meaning scaly. The pulp is of a creamy-yellow color, and contains numerous thick black seeds as large as a navy bean. In taste it is like a delicious custard, very sweet, and to the novice apt to be unpleasant at first. The shrub is of a low bushy growth, rarely attaining a height of more than 15 feet. It is very prolific, small plants only three or four years old and less than 5 feet in height having been known to ripen 30 or 40 fruits in one season, as far north as the Manatee River. The sugar-apple, being of low growth, can be managed under such sheds as are used in Orange County for the pine-apple, and are then reasonably safe from frost even in middle Florida, except in case of unusually cold weather. Like many of the Anonas, the sugar-apple is deciduous or nearly so. The farthest north that we have information of the successful fruiting of the sugar-apple in Florida, is at Norwalk, in Putnam County, where it was fruited before the freeze, by Mr. Thomas P. Frank. There were many old bearing specimens on the south side of the Manatee River, previous to the freeze, where the fruit sold locally for 60 cents per dozen.

The finest trees on the west coast are at Mr. Collier's, at Marco, on high shell hammock. At Key West it is a common tree in the yards, and is also grown more or less along the Indian River as far up as Cape

Canaveral. On Plantation, Largo, and Matacombe keys, it is grown extensively for the Key West market, being planted in the worn-out pine fields. The sugar-apple is no exception to the general rule of fruit-trees in preferring high well-drained land for its perfect development. The only disease, if disease it may be called, to which the tree seems to be subject, is a decaying of the roots from the bottom upwards in winter, when the plant is nearly dormant. The only cause to which we can ascribe it is planting in land not perfectly drained, though the continued cool weather of some of our winters may partially cause it.

There are no well-marked varieties of the sugar-apple other than the common form.

CHERIMOYA, OR JAMAICA APPLE. 4

(*Anona cherimolia*; *A. tripetala*; *A. Humboldtiana*.)

The cherimoya in Florida is confined to about the same territory as the sugar-apple, and is grown to about the same extent on the lower keys, though it has formerly not been so commonly grown along the Indian River and Gulf coasts as the sugar-apple.

The fruit varies from the size of an ordinary apple to 6 inches in diameter. Indeed in its native home (Peru) it is said sometimes to attain a weight of from 14 to 16 pounds. The color when ripe is brownish-yellow, sometimes with a rich red cheek. The shape is not unlike a very large Fall Pippin apple, but with no depression, except at the stem end. The skin is thin, nearly smooth; flesh quite rich, creamy, and abundant; very sweet, but hardly so apt to be relished by the novice at first as the sugar-apple. Seeds many, in the outer part of the pulp, as in all the anonas. They resemble those of the sugar-apple, but are a trifle lighter brown in color.

The foliage of the cherimoya is of a light yellowish-green, thicker and more glossy than the leaves of the sugar-apple, and very much larger—often 4 or 5 inches in length. The tree is of a stouter and more upright growth, and attains a larger size than the sugar-apple. It seems to be rather more hardy than the sugar-apple. It is grown in the milder coast regions of Spain, and we have read in a late agricultural paper that it has ripened fruit in southern California. The tree is deciduous, and there are no prominently-marked and well-known varieties.

SOUR-SOP.

(*Anona muricata*.)

This is the "Guanabena" of the Spanish West Indies, where it is native. The tree is one of the most tender as well as the most beautiful of all of the anonas. The leaves are as large as those of the apple, of richest glossy green, and the tree attains the size and height of an ordinary peach tree. The fruits are very large, ordinarily weighing from

2 to 4 pounds; the shape is irregularly oblong, bluntly pointed at the extremity; color, dark green externally; the rough skin broken into scales, which end in feeble spines. The pulp is soft, white, and very juicy, and of a peculiarly flavored acid or subacid taste. To the northern palate the first taste is anything but re-assuring; it has even been compared to a "ball of cotton soaked in turpentine;" but, as is the case with many tropical fruits, the taste for it is gradually acquired, until it is thought delicious. The tree is but little grown yet in south Florida, though the Cuban fruit sells readily in Key West at from 10 to 50 cents apiece. It is much used for flavoring ice-cream, etc., and is also prepared with sugar and water into a cooling drink in much the same way that the lemon, lime, sour pomegranate, and tamarind are used.

The sour-sop fruited previous to the freeze of 1886 as far north as Manatee, in the grounds of Capt. John Fogarty. The tree had never had artificial protection or special care. It is known in the French West Indies as the "Corresol," and by the Indians was known as "Suirsak," from which the name sour-sop is thought to have been corrupted.

The sour-sop seems to have received more attention and cultivation and to have attained greater size and excellence in Porto Rico than anywhere else, and the Porto Rico guanabenas have almost the fame of the pine-apples of that place. The wood and foliage of the sour-sop, as is the case with all anonas, has a strong and somewhat disagreeable odor.

POND-APPLE.

(*Anona glabra*, or *Laurifolia*.)

This species has for some years been erroneously called the "Custard-apple" in south Florida. It is a native in the swamps, both salt and fresh water, of south Florida, from the headwaters of the Manatee River to Matacombe, and up along the Indian River. It is one of the commonest trees of the everglades, and is often met with in cultivation. North of Charlotte Harbor the trees suffered considerably by the freeze of 1886, but have now grown out vigorously, and are occasionally fruiting again on the young shoots. The tree is also common throughout the West Indies and on the main-land of Honduras, and is perhaps identical with the *Anona palustris* of Cuba.

The tree is more inclined to be an evergreen than most species of *Anona*, especially when young. The leaves are a beautiful glossy green, large, thick and smooth, as the name implies. The fruit is somewhat conical, with blunt point (not unlike a Bellflower apple in shape), and when ripe the large stem pulls out of the fruit, leaving a hole half way through it. The color is yellow, or brownish-yellow, on the outside; pulp a rich cream-color, and contains the large allowance of seeds usually found in the *Anonas*. The whole fruit is delightfully fragrant, and its flavor is liked by many, though it is held in least estimation of any of the *Anona* fruits.

CASHEW-NUT.

(*Anacardium occidentale*. Maranon, of the Spanish West Indies.)

We give entire a description of the Cashew-nut from the Florida Agriculturist for March 12, 1884:

A tree of the natural order of Anacardiaceæ, a native probably of the tropical parts of both hemispheres, although it has been commonly regarded as of American origin. It is a spreading tree of no great height. It abounds in a clammy, milky juice, which turns black on exposure to the air, and is used in India for varnishing, but it is so acrid as to produce painful inflammation when it comes in contact with the skin of persons, or when they are exposed to its fumes. The fruit of the tree is a kidney-shaped nut about an inch long, seated on the thicker end of a pear-shaped fleshy stalk, from which the botanical character of the genus is derived. The shell is double, the outer shell being ash-colored and very smooth; and between it and the inner one is a layer of a very caustic black juice. The kernel is oily, and very pleasant and wholesome, and is in common use as an article of food in tropical countries, being made into puddings, roasted, and in various ways prepared for the table. In the West Indies it is put into wine, particularly old Madeira wine, to which it is thought to communicate a peculiarly agreeable flavor. It is also, for the same reason, sometimes an ingredient in chocolate. Yet the vapor which arises from it in roasting, but which is derived from the coating of the kernel and not from the kernel itself, is so acrid as to cause erysipelas and other painful affections of the face in those who conduct the process, unless great caution is used. The fleshy stalk, sometimes called the *cashew-apple*, varies in size, being sometimes not much larger than a cherry and sometimes as large as an orange, and is white, red, or yellow. It is perfectly free of the acidity characteristic of the natural order, is acid and eatable, very pleasant and refreshing, and much used by the inhabitants of the countries in which the tree grows. A very pleasant vinous liquor is obtained from it by fermentation, and this by distillation yields a spirituous liquor highly esteemed for its flavor. A gum which exudes from the bark of the tree, quite distinct from the milky juice already mentioned, is black, but otherwise very similar to gum arabic.

The cashew-nut, though an exceedingly tender plant, will often winter in the open air as far north as Manatee, though extreme south Florida is best suited to its cultivation. It has as yet received but very little notice in Florida, though it has fruited in a few instances. The tree bears fruit when very small, and may be easily cultivated and fruited in greenhouses. The first seeds or plants probably brought to Florida were distributed by Colonel Codrington, of De Land, at that time editor of the Florida Agriculturist. There is probably no hinderance to its successful cultivation on the lower keys.

CARAUNDA. .

(*Carissa carandas*.)

This is occasionally met with in south Florida, grown as an ornamental shrub. It is a native of India, where it is appreciated for the sake of its cherry-like fruits, which are used when green for pickling, and when ripe for tarts and preserves. The shrub is half hardy in middle Florida, and might prove valuable as a hedge plant, the large branched thorns being very formidable. It is locally known as "Christ-

thorn." The flowers are large, white, and fragrant; the fruit does not seem to be very freely produced in Florida; it is of a reddish color, and an inch in diameter. The tree, or shrub, thrives best in a dry well-drained situation. It is evergreen, with dark-green thick glossy leaves. Another species is *Carissa arduina* (*Arduina grandiflora*), a native of Natal, in Africa, where it is known as the "Amatungulu." This species was introduced from Australia, several years ago, by Mr. Theodore L. Mead, of Oviedo, and it produced fruit at his place in Eustis, Orange County, for several years previous to the freeze of January, 1886. It bears sharp frosts unharmed, and had never been injured previous to the freeze. The fruit is red, cherry-like, and of delicious taste. It is said to make an excellent preserve. In appearance the shrub closely resembles its congener *C. carandas*; it is very thorny, and of comparatively slow growth. It sprouts readily from the roots when frozen back, and really merits quite extensive cultivation.

COCOA-PLUM.

(*Chrysobalanus icaco*.)

This fruit is occasionally met with in cultivation. It is native in the West Indies, and in south Florida as far north as Kettle Harbor, on the west coast. It is well worth cultivation, as an ordinary bush or tree for the beauty of its thick, glossy, evergreen foliage and delicately-colored white and rose-tinted plum-like fruits. It takes its name from the resemblance of the seeds to the shape of the cocoa-nut. The fruit is sometimes eaten, but it is astringent, and of but little value, unless improved by selection and cultivation.

STRAWBERRY PEAR.

This is the fruit of *Cereus triangularis*, a tall climbing cactus of tropical America, with large triangular stem, and one of the largest, handsomest flowers of all the night-blooming species of *Cereus*. The scaly buds of this cactus are known among the Jamaican peasantry as "God-ochro," and are used by them as a culinary vegetable—particularly as an ingredient in soups. They were formerly used in the preparation of the celebrated West Indian "pepper-pot." The fruit of the strawberry pear contains a pleasant sweet pulp, inclosing numerous black seeds. The *Cereus triangularis* is often seen in cultivation in south Florida, but, although flowering freely, it rarely produces fruit.

CANDLE CACTUS.

(*Cereus serpentinus*.)

The candle cactus is a native of the southern and western keys. It is a night-blooming species, with large handsome straw-colored or white flowers, and producing round fruits of an orange-red color the

size of a walnut. They are often eaten, but are really of but little value. The plant has not been cultivated for its fruit.

SEA-GRAPE, OR SHORE-GRAPE.

(*Coccoloba uvifera*, Jacquin.)

The sea-grape of the salt-water coasts of tropical America, extending in Florida as far north as Tampa Bay and Cape Canaveral, is occasionally, though rarely, met with in cultivation. The tree was pronounced by Kingsley to be without exception the "handsomest broad-leaved evergreen" he had ever seen. The large broad leaves are beautifully veined with crimson. The tree, like the cocoa-palm, likes the vicinity of salt water, but it is highly probable that it can be cultivated with some success in the interior of south Florida in protected localities, or anywhere else, in a suitable climate, at any distance from the sea. The tree is usually low and spreading, but sometimes reaches a height of 20 feet or more. The wood is very hard and heavy, and valuable for cabinet work. The fruit is produced in clusters, and much resembles purple grapes; there is one large seed in the center, and the surrounding pulp is of pleasant taste, and is much appreciated along the Florida coast, where it is eaten raw, or in preserves and jellies. North of Charlotte Harbor most of the trees were severely killed back by the freeze of 1886, and though sprouting up vigorously afterwards no crop of fruit was produced last year or this in this latitude.

PIGEON PLUM.

(*Coccoloba floridiana*, Meisner.)

This is another native tree of south Florida, producing fruits of agreeable taste, mentioned here as perhaps worthy of test-culture. It has a much smaller geographical range than *C. uvifera*, and is practically confined to Florida south of the Caloosahatchee. The leaves are smaller than those of *C. uvifera*, and of light-green color.

PAWPAW, OR MELON PAWPAW.

(*Carica papaya*.)

The varieties of this plant are numerous, differing in shape and color of leaves, size and taste of fruit, etc. There is a variety native in south Florida, along the coast from Tampa Bay southward, with pale-green leaves, and small, almost bitter, fruit the size of an egg, or smaller. The fruits are seldom eaten except by the birds. The variety commonly cultivated in the West Indies and south Florida is of dwarfish habit, leaves of dark green, and fruit the size of a small musk-mellon, which it resembles in taste. Another very scarce variety bears immense fruit, of 5 and 10 pounds' weight. The generic name, *Carica*, is said to be from Caria, where the tree was first cultivated. The plant is a native

of both the East and West Indies and of the west coast of Africa. Like the banana, it is now intratropic around the globe, and in many localities, like Florida and southern Europe, its culture extends far outside of the tropics. The pawpaw is a quick-growing tender plant, blooming and fruiting usually the second year from the seed. The large seven-lobed terminal leaves resemble those of the castor-bean, or of the tropical Cecropia. It is very beautiful, almost palm-like in appearance, and rarely branches, unless the stem is broken off, frozen off, bent over, or mutilated in some other way. It attains with age a height of 20 or 30 feet. The flowers are rather small and insignificant, yellow, and appear on the stem at the base of the petioles of the leaves, directly under the crown. The yield of fruit is immense, especially while the plant is young. We have known plants to perfect between 20 and 30 fruits each, from 4 to 6 inches in length, during one fall and winter, and when the plants were but two years old from the seed. The fruit is sliced and eaten raw like the musk-melon, cut up and stewed with sugar (when it resembles apple-sauce), and cooked in many other ways, when either green or ripe.

The pawpaw plant is famous the world over for its singular property of making raw meat more tender. The meat is placed between the bruised leaves of the pawpaw but a short time, or rubbed with the rind of the fruit. The pawpaw is ordinarily dioecious, but in some instances has perfect flowers, as we have known a number of cases where isolated plants bore fruit in profusion.

Though the plant is very tender, it will stand many of our south Florida winters unharmed, and occasionally attain an age of ten or more years, even as far up as Tampa Bay, in locations with good water protection. The young plants, if protected with a barrel, or keg, or anything similar, in case of frosty nights, will bear fruit the following fall and winter. In this manner they can be grown easily as far north as middle Florida. The freeze of 1886 of course killed all unprotected plants in middle Florida, and in many places as far down as the Caloosahatchee. The plant thrives best in a high and dry location. In the wild state it is most commonly found on high shell mounds or shell hummocks. Water standing about the roots for any length of time is almost sure death to the plants. The pawpaw is probably not a fruit that would "take" well in northern markets, and, besides, it is so tender that it will not stand twenty-four hours' transportation when ripe. It is of value, therefore, only to grow for home use. The tree is propagated from seed only, of which the hollow in the large melon-like fruits is full.

OTAHEITE GOOSEBERRY.

(*Cicca disticha*, *C. racemosa*; *Phyllanthus distichas*.)

This is a valuable fruit, sometimes cultivated in south Florida, and deserving of still more extensive cultivation. The tree is quite tender, and its open-air cultivation is limited at least to the territory mentioned

as suitable to the cultivation of the sapodilla. It has produced fruit in Orlando, and for many years in considerable quantity at Manatee. The tree belongs to the natural order Euphorbiaceæ and is one of the most beautiful tropical trees in existence. The leaves are light green, compound pinnate, and made up of many leaflets—the whole leaf being a foot or more in length. The waxy white fruit is produced in clusters like currants, which hang directly from the trunk and large branches of the tree. The individual berries resemble the fruit of *Eugenia uniflora* in shape and size. The fruit is produced in immense quantities, a tree four or five years old often yielding half a bushel of fruit. In taste it is a sharp acid, not usually eaten in large quantities in a raw state, but very highly esteemed for pastry, jellies, and preserves. It ripens in midsummer, and extends through a season of several weeks.

The new growth of the tree has a faint tinge of wine-color, and the foliage, combined with the quantities of white berries, produces a beautiful effect. The Otaheite gooseberry trees on the Manatee River were killed to the ground by the freeze of 1886, as were all specimens above the lower keys, but they have since sprouted up vigorously. The tree has no insect enemies that we know of.

COCOA-NUT PALM.

(*Cocos nucifera*.)

Cocoa-nut culture has become one of the leading industries of south Florida, promising to rival even the culture of the pine apple on the lower coast and islands. For many years a few trees have been growing at Cape Florida on Indian Key, and in Key West. Some of the cocoa palms in Key West are probably sixty years old or more, and those of Indian Key at least antedate the residence of Dr. Perrine on that island fifty years ago. The oldest large groves on the keys are on Plantation Key, some of which were planted before the war.

The culture of the cocoa-nut in the United States (for profit) will be limited to that part of south Florida south of Charlotte Harbor, as it is one of the most tender palms known as regards frost. It will sometimes stand the loss of its leaves by frost and afterwards recover; but where such frosts are likely to occur, its cultivation for fruit can not be made profitable.

Previous to the freeze of 1886 a young tree had survived six winters at Lake Harris, others were growing in Tampa, and in Maj. A. J. Adams's grounds at Manatee a ten-year-old tree was blooming for the first time. These were all killed outright by the freeze. On the west coast from Charlotte Harbor south the trees generally escaped with the loss of foliage only, though at Mr. W. S. Allen's place, on Chuckaluskee Bay, two large trees, probably thirty years old, were killed, while others near by escaped. On the lower range of keys the injury was not so great, but the milk soured in all the nuts on the trees, thus making the crop

worthless. Since then the nuts have been much smaller than usual, probably the effect of the shock received.

The cocoa palm also exists in a precarious condition on the Gulf front of the parishes of Plaquemines, Terre Bonne, Saint Mary, and Cameron, in Louisiana.

The cocoa palm, as is well known, likes the proximity of the sea, but otherwise is not very particular as to elevation or quality of land on which grown, though of course produces the best results in rich land. The largest cocoa-nut plantations in south Florida are on the main-land, at Cape Sable (where Mr. J. A. Waddell has 42,000 young trees), on Upper Matacombe, Plantation, and Largo keys, and at Biscayne Bay. The oldest groves are on the keys, where there are many acres in bearing trees.

The cocoa-nut palm in full bearing, it is claimed, will produce enough food to support a man in case of necessity, averaging one nut per day throughout the year. This rule, however, can be taken with due allowance, about twenty nuts per month being the average on the Florida keys. The tree blossoms and ripens nuts throughout the year without cessation.

So far as we know the cocoa-nut disease, so destructive in the West Indies during the past few years, has not appeared on the Florida keys. It is thought, however, to have been occasioned by the continuation of unusually dry seasons for several years, and in Florida no unusual drought has been experienced. Neither has the "scaly blight" (thought to be the effect of drought also) made its appearance. Rats have not become the pest among cocoa-nut trees that they are in the West Indies, but it will be well for our growers to "keep their eyes open," and be ready to make war on such pests the moment they appear. In Jamaica wide sheets of zinc are nailed around the trunks of trees, over which the rats can not climb.

Most of the cocoa-nuts produced at present on the keys, and that are not consumed in Key West, find a market in New York.

As suggested in the notes on pine-apples, there is another chance for advancement here, in place of marketing in New York; though of course the cocoa-nut will stand any amount of shipment, and can be more widely distributed than the pine-apple, as it is not so perishable.

The largest young plantation of cocoa-nuts in Florida is probably at Biscayne Bay, where Mr. Ezra Osborne has 300,000 young trees, covering nearly 4,000 acres. Messrs. T. A. & E. A. Hine also have immense young groves on the shores of Biscayne Bay, Sanders Key, and Long Key. The historic Indian Key has also been planted entirely to cocoa-nuts, and miles of coast-line along the Florida keys and lower main-land will in a few years be covered by the waving plumes of this beautiful palm.

The oldest cocoa-nut grove on the main-land of Florida is at the mouth of the Miami River, on Biscayne Bay, which was planted forty years or

more ago, on the site of old Fort Dallas. The trees were originally about 150 in number, but some years ago more than half of them were destroyed by a hurricane, and comparatively few now remain.

VARIETIES.

The varieties of the cocoa palm are described as quite numerous in the East Indies, but the common type of the species seems to be the only one yet grown in Florida. The King cocoa-nut and the Dwarf cocoa-nut are said to be varieties highly prized in Ceylon, neither of them, however, attaining a height of more than 20 feet.

ROSE-APPLE, OR JAMBOSADE.

(*Eugenia jambos*; *Jambosa vulgaris*.)

This handsome tree is a native of the East Indies, though it has been long grown in the West India Islands; and in the Spanish West Indies it is known as *Poma rosa*.

The tree is evergreen, with long and narrow leaves, in shape much like those of an oleander, very glossy and shiny. The new growth, as is the case with so many tropical trees, is of the richest wine-color. The tree is fully as hardy as the ordinary guava, and succeeds on very poor land. It ultimately forms a spreading tree of 20 to 30 feet in height. The flowers come out in late summer, varying in color from a creamy-white to greenish-yellow, and the fruit ripens from December to May. The fruit much resembles a very large Siberian crab-apple, is white or yellowish, sometimes with a delicate red blush on one side; is rose-scented, very fragrant, and with something of the flavor of a ripe apricot.

The tree when killed down by frost sprouts from the root as readily as the guava. The tree is rare in Florida, as the few plants growing in this vicinity were killed down to the ground by the freeze of 1886.

We know of no insect enemies to this tree, or to any of the *Eugenias*.

CAYENNE, OR SURINAM CHERRY, OR PITANZA.

(*Eugenia uniflora*, syn. *E. Michellii*.)

This is a most valuable fruit tree or bush, almost hardy enough to be classed as semi-tropical, although a native of the equatorial regions of South America. The red cherry-like fruits have a delicious acid taste, and though a hard freeze like that of 1886 will sometimes kill the tops of the plants, it is ordinarily hardy, and produces fruit abundantly as far north as Putnam County, Fla. Some specimens here, though hurt by the freeze, are again fruiting this summer. The tree is quite frequently met with in Orange County and middle Florida, and is gaining in favor as a fruit-bearing plant. The leaves are ovate, of richest bronzy-green, and the new growth of a bright wine-color.

GLYCOSMIS AURANTIACA.

This plant is closely related, and perhaps identical with *Glycosmis citrifolia*, (*Limonia parviflora*). It is from China, and attains a height of 6 or 7 feet, and bears several degrees of frost unharmed. It produces small, red, berry-like fruits. A fine specimen fruited freely for Mr. Bidwell, in Orlando, previous to the freeze, but was then killed to the ground.

MAMMEE APPLE, OR ST. DOMINGO APRICOT.

(*Mammea Americana.*)

A native of the Carribee Islands, now cultivated universally in tropical America. It is a tall-growing tree, with oval, shiny, leathery leaves, somewhat resembling those of the red mangrove; one-flowered peduncles, with sweet-scented white flowers $1\frac{1}{2}$ inches in diameter, followed by large, round, brown fruits 3 to 6 inches in diameter, and containing one to four rough seeds as large as a black walnut without the husk, surrounded by a yellow juicy pulp. The pulp is of delicious flavor, and the taste does not have to be acquired by those unacquainted with it. The taste is not unlike that of an apricot. It is always eaten raw, either cut in slices, with wine and sugar, or sugar and cream, or preserved in sugar. The tree is occasionally met with on the lower keys, where there are some bearing specimens. It is nearly as hardy as the sapodilla. The fruit can be shipped fairly well for a tropical fruit, standing a week or more of transportation. The fruit is popular in Key West, but as yet the market is supplied from Cuba.

SPANISH LIME, OR GINEP.

(*Melicocca bijuga.*)

This West Indian tree, of the family Sapindaceæ, has proved itself capable of bearing several degrees of frost unharmed, but it can hardly be called semi-tropical. It is a tree of slow growth when young, but eventually reaches a height of 20 or 30 feet. The foliage is peculiarly odd; compound leaves with winged petioles, much resembling those of *Sapindus saponaria* (the West Indian soap-berry). It produces a yellow plum-like fruit, the pulp of a pleasant grape taste, and inclosing a large seed, which is often roasted and eaten like the chestnut. The fruit markets well in Key West, and there are a number of fine bearing trees in that place, and on the other islands. It is worthy of more attention all over south Florida.

DOWNY MYRTLE.

(*Myrtus tomentosus.*)

This shrub was first cultivated in Florida by Mr. E. H. Hart, of Federal Point, Putnam County. It is a handsome and quite hardy ever-green shrub, a native of the Neilberry Hills, of northern India. The

fruits are produced in profusion; they are red, of the size of a gooseberry, and of an agreeable sweet taste. The flowers are pink, five-petioled, and resemble in size those of the Dog rose, making it a very ornamental plant. It succeeds admirably in Florida, but is not yet much grown. It is a fit companion to the Cattley guava, and, like them, best cultivated after the manner of currant-bushes. In Putnam County the tops were killed down by a big freeze, but have recovered, and are bearing fruit again this year.

CERIMAN.

(*Monstera deliciosa*, *M. per tusa*; *Philodendron pertusum*.)

This is a rare and highly ornamental aroid plant, a native of the forests of Trinidad. It is a half scrambler, half climber, often in its native forests ascending tall trees, to which it clings with its wiry roots, which come out anywhere on the stem. The large leaves are cut and forked and full of oval holes. It is said of this plant when flowering that "so fast does its spadix of flowers expand, that (as indeed do some other aroids) an actual genial heat, and fire of passion which may be tested by the thermometer or even by the hand is given off during fructification." The plant is rare in Florida, but has been fruited by Dr. Harris, of Key West. It will bear a slight frost unharmed, and it is probable could be cultivated quite extensively in south Florida were more plants obtainable. The fruit is said to resemble very much an elongated green-pine cone. It is about 6 inches in length, and when ripe the skin comes off easily in small octagonal sections, leaving the fruit with the appearance of a ripe banana.* It is said to have the combined flavor of pine-apple and banana, though superior to either.

MANGO.

(*Mangifera Indica*).

Next to the finest varieties of pine-apples, and perhaps also the mangosteen, there is no more delicious fruit in the world than the mango. No fruit stood higher in the popular esteem in parts of south Florida than the mango at the time when the disastrous freeze of January, 1886, killed to the ground every, or almost every tree north of Fort Myers.

The mango is an evergreen, with lanceolate leaves from 6 to 10 inches long and two or more inches broad; on the new growth they are of a rich wine color, which gradually changes as the twig hardens up to dark shining green. The tree makes from two to ten separate growths each year, according to age, cultivation, etc., stopping to harden up after each growth. The flowers are produced in loose panicles at the ends of the branches, and are of no particular beauty. The fruit is a large kidney-

* They grow to fully 8 inches in length here in the hot-house of this Department. H. E. Van Deman.

shaped drupe, covered with a smooth, softish, resinous, pale-green, yellow, or half-red skin, and containing one large seed, extending nearly the whole length of the fruit. The shell or outer coat of the seed is rough, fibrous, and compressed. The inside or kernel of the seed is chestnut-like, and in tropical countries is often roasted and eaten in the same manner in which "young America" takes his chestnuts.

In most of the common varieties the pulp of the fruit is full of fibers. This fact often makes the sucking of the mango a more comfortable than elegant process. Indeed, a novice in mango-eating has been known to say that it reminded him of "sucking a ball of cotton soaked in turpentine and molasses." The entire mango tree, leaves, wood, and fruit, have a sweet resinous smell, which the uninitiated liken to turpentine, but after a few trials it usually becomes a delightful fragrance.

The mango tree is a native of India and some other parts of south Asia. It is cultivated for fruit in northern India to an elevation of 3,500 feet in the Himalayas, just outside of the tropics. The tree was introduced into the hot-houses of England in 1690, and probably to the West Indies a few years after, as we hear of its being naturalized there and spreading spontaneously, at least in Jamaica, as early as 1790.

The mango is a most useful fruit; as in countries where it is planted it forms a staple article of food through the hot months—a most healthy food, too, and, besides being eaten raw, is made into jellies, preserves, wine, and even starch and glucose are manufactured from it. Horses, cattle, pigs, goats, and even chickens eat the fruit readily and thrive upon it.

The export of mangoes from Jamaica for the year 1884 was 126,968 fruits, of the value of about \$900, but the trade was then and is yet in its infancy, and is increasing every year. The cultivation of the mango in the United States will be confined in Florida to the belt already given as adapted to the sapodilla.

The mango was introduced into Florida about the year 1840 by Dr. Perrine, who perished in the massacre of Indian Key, but none of the plants introduced by him stood the vicissitudes of fire, war, and neglect, and many years elapsed before the experiment was again tried. Its later introduction was to Point Pinellas, about fifteen years ago, where two seeds were planted, but which did not grow off well. In 1877, however, Mr. William P. Neeld, of the same locality, planted three seeds, two of which grew luxuriantly, and are the parent trees of many of the mangoes growing in different parts of the State. One tree fruited in its fourth year; from the sale of fruit and seeds \$9.15 was realized. The other fruited in the fifth year. Fruit-trees so very prolific as were these two trees during the next two years are rarely or never seen elsewhere. The yield seemed to surpass that of the mango on clay soils in any part of the tropics; the yellow, porous, sandy soil proving perfectly adapted to their healthy growth and fruitfulness.

In their eighth year an experienced orange-grower who saw them estimated that there were 19,000 mangoes on the two trees. Some of these fruits were one pound in weight. "In the mean while three more had come into bearing in his grove; the neighbors had obtained seeds from him, and here and there trees were beginning to bear and raising high the hopes of profit." In all cases where the trees were well cared for they produced from 4,000 to 9,000 mangoes each when once well in bearing. One grower on the point sold from eleven trees in the fourth year from the seed fruit which brought him \$219. In their sixth year he shipped bushels to various places, realizing at Chicago 60 cents per dozen, and the fruit shipping well. Another grower received from the produce of one of his bearing trees \$66 in its sixth year. Many young trees were set out and many coming into bearing.

At other localities than Point Pinellas considerable start had been made. There were fifteen large bearing trees and hundreds of smaller ones between the Manatee River and Kettle Harbor. At Fort Myers and along the Caloosahatchee there were a number of bearing trees, and Dr. Kellum had a large grove set out on the Caloosahatchee. At Orlando there was one bearing tree and many small ones, and other trees were occasionally seen in different parts of south Florida, though on the keys and shell hammocks of the lower coast they do not succeed as well as on the high yellow sandy soil farther north.

Then came the freeze of January, 1886. Every mango tree of any size north of the Caloosahatchee was killed to the ground, and many of them were killed entirely.

Last winter was also very cold in some localities, and many of the small plants set out the previous summer were killed, but in places protected by fresh or salt water on the north or northwest they were not harmed.

It is estimated that on Point Pinellas there are at present not far from 1,000 young trees in the ground, and should another series of our customary warm winters occur it is probable that the number will soon be increased tenfold. Other localities in the south of Florida, where there is good water protection, are not far behind Pinellas in the number of trees planted out. The only fruit produced this year in the State is on the lower key, and there there are but two trees bearing, and none growing so vigorously as they do in the protected parts of Hillsborough, Manatee, De Soto, Brevard, Polk, and Orange counties. Here the only obstacle against their successful culture is the occasional frost, and such a freeze as that of 1886 has been known in the State but once before—in 1835. A sharp white frost does but little comparative damage, except to young trees.

The variety in most common cultivation is the common or "turpentine" mango, really one of the most inferior sorts grown, but much better than "no mango at all."

In 1885 an attempt was made by Rev. D. G. Watt, of Pinellas, to introduce some of the delicious Indian varieties (the finest mangoes in the world are said to grow in India, many entirely without fiber in the pulp, and of such exquisite flavor that they are held in high esteem by every one). A Wardian case was sent to Mr. Watt from Calcutta, containing eight grafted plants of the two best sorts—Bombay and Malde. They were nearly three months on the passage, and when the case was opened five were dead; another died soon after, and the two remaining plants were starting nicely, when the freeze destroyed them entirely. Since then other attempts to introduce the best varieties have been made, and it is probable that within the present year many of the best kinds will have been successfully transplanted to Florida soil.

It is worthy of note that the first mango fruit probably produced in Florida was on a tree belonging to Mr. Tinny, of Clearwater; whether this tree was planted before those at Pinellas or not we do not know. Mr. Jeffords, of the same locality, had a tree that was planted about the same time.

The mango is propagated from seeds and by inarching (or "grafting," as it is often wrongly termed). The seeds lose their vitality in a few days after being taken from the fruit, and this fact makes it exceedingly difficult to obtain seeds of the best varieties from foreign countries. The process of inarching is of course slow and laborious, and only employed in propagating the finest varieties.

When fresh seeds are planted the seedlings soon appear above ground. The pod or shell incloses from two to ten separate germs, each of which may make a tree if the plants are taken up and divided during the first year of their growth, before they have time to grow together; or, though all are compressed into one apparently solid kernel, they may readily be separated without damage to each other, but more usually after the plants are up. The seeds germinate more readily if the shell, or outer coat of the seed, is removed before planting. The process of inarching, as is the case with most fruit-trees, hastens the time of fruiting of the tree, an inarched mango bearing before a seedling. In Florida, however, seedling mangoes usually bear two or three years sooner than they are reported as doing in most other countries where the mango is grown; almost always producing fruit by the fourth or fifth year, and often even the third year, from the seed.

The mango tree succeeds best on high well-drained soil, and is especially successful on the rolling land of south Florida, where the yellow subsoil so favorable for the orange tree is found.

All the fruit raised in Florida previous to the freeze of 1886 met with a ready sale at from \$2 to \$5 per hundred. The fruit may be canned, preserved, or used in almost any way that the apple and peach are prepared. The mango-wood is tough, and in tropical countries often used for various purposes in wagon-making, etc.

VARIETIES.

The varieties of mango are numerous and distinct. Forty or fifty sorts are known in the East Indies and many of the West Indies.

The following are known to be growing in Florida (some of the names are local, and the varieties may possibly be identical with varieties grown elsewhere under different names):

Apricot mango.—The best sort that has yet fruited in Florida. Size, medium to small; color, yellowish-green, with red cheek, and fewer black spots than the common mango. Flavor, rich and spicy, with the taste of a luscious apricot or plum, though superior to either. The turpentine taste entirely wanting. The foliage of an old tree differs slightly in appearance from that of the ordinary mango, though the difference is hardly distinguishable when the plants are young. Fruit ripens from three to six weeks later than the common mango. This variety was much grown on Point Pinellas, and was introduced by Mr. William P. Neeld, whose oldest tree was about seven years old when killed by the freeze.

Apple mango (Mango de manzano).—Very large and pulpy; irregularly apple shaped; stem depressed in most cases; color of the common mango; almost entirely without fibers, and possessing a certain spicy taste peculiar to the variety. Good sized specimens occasionally measure 5 or 6 inches in length. Introduced from Cuba. Not yet fruiting in Florida.

Lobed apple-mango.—One of the best varieties cultivated in Cuba. Fruit long, with deep furrow or crease on one side, extending the whole length; red-checked, with few fibers, and of excellent flavor. The fruit sells in Havana for three or four times the price of common mangoes. Introduced from Cuba. Not yet fruiting in Florida.

Purple apple-mango.—Long, medium sized; color, green, with rich dark-purple blush—no fibers whatever in the pulp; flavor good. Introduced from Cuba. Not yet fruiting in Florida.

Common or turpentine mango.—Large, with more or less black spots; color, greenish-yellow, often with red cheek; skin with some turpentine flavor. Grown commonly in south Florida.

Common yellow mango.—Size, medium; color, rich orange, with fewer black spots than the common mango; flesh, very firm; flavor, rich and sprightly. Not fruiting in Florida that we know.

Curacaoa.—Not fruiting in Florida.

Guatemala.—An early variety, not fruiting in Florida.

Kallia (from India).—Not fruiting in Florida. Named from the Hindoo word "kala" (black). The fruit is very dark-colored; hence its name of "Blackie."

Kakria.—Another Indian sort not yet fruiting in Florida. Named from "Kakri," the native name of a kind of cucumber. The fruit is pale green when ripe, and very long; hence its name from a supposed resemblance to this cucumber.

Lafsia (from India).—Not yet fruiting in Florida. The name is from “Lafsi,” a native mixture of flour, sugar, and clarified butter. The flesh of this mango is supposed to resemble this compound or native sweetmeat.

Manga.—This variety is so called in Cuba, though why we do not understand. It is the feminine form of mango, but as both sorts have perfect flowers, its meaning is not obvious. Shape, nearly round; size, medium; color of pulp and skin, light-yellow or greenish-yellow with no trace of red; contains plenty of the objectionable fibers, but is very sweet and fine-flavored, and preferred by many to any other mango.

No. 11 *Mango* (from Jamaica).—Not yet fruiting in Florida. The circumstances relative to the naming of this celebrated variety are given as follows by Colonel Codrington in the *Florida Agriculturist* for June 13, 1883:

When the French vessel, loaded with tropical fruit from the South Sea Islands for Hayti (then a French colony), was captured by Admiral Rodney, the book containing the local names of the fruits was thrown overboard, and it was only from the numbers on the labels that the fruit was named in English.

This variety is preferred by many to the finest East Indian mangoes, and single specimens are said to often weigh 4 pounds each. The skin is green, pulp of exquisite flavor, rather acid near the seed. Largely grown in Jamaica, where it is gradually superseding the more inferior varieties.

The following are popular varieties in different mango-growing countries, but not yet introduced into Florida:

Amelie: Martinique.

Alphonso: India.

Arbutnot: India.

Arracan: India. One of the sorts grown in the gardens of the agri-horticultural society, Calcutta.

August: India.

Archall: India.

Bombay: One of the finest of the Indian varieties. This variety and the Malda, are the two most popular varieties, in favor with every one who tastes them, while some of the other varieties are delicious to some people and to others unendurable.

Bhadouria: India. A late-ripening variety.

Bindabunnee: India.

Bhutoora: India.

Bell: India.

Bataree: India.

Cedot: Martinique.

China.

Chukkukeea: India.

Cræsus: Martinique.

Desi Bhadouria: India. Very late in ripening, which the name signifies. Valued only on this account.

D'Or: Martinique.

Dodol: The largest Indian variety, the fruit weighing over 2 pounds, usually of the size of a shaddock.

De Cruze's Favorite: India.

Davis: India.

Freycinct: Martinique.

Fifine Gabrielle: Martinique.

Feroghabunnee: India.

Gopal Bhog: India. Deep amber and orange color when ripe.

Goa.

Heenghia: India.

Julie: Martinique.

Jacot: Martinique.

Kidney: Common in Nassau. Skin green; pulp rather watery and very stringy.

Kysapatec: India.

Langera: India.

Lucknow: India.

Malda: (Syn. *Large Malda*.) India.
 "Size, medium; color, olive-green, deep orange color inside." About the finest of all.

Martin: Martinique.

Mazagong: India. The fruit of this variety is said to be so delicious that guards are placed over the trees during the fruiting season.

Moorshebad: India.

Madras: India.

Madame: India.

Nagroo: India.

Peter: India. "Size, medium; shape, almost round, with a projecting heel on one side; color, dull russet, with reddish tinge."

Patheria: India.

Poiget Dore: Martinique.

Sabot: Martinique.

Singapore: India. Large; color, greenish-yellow.

Soondershaw: India. (Perhaps identical with Soondooria.)

Soondooria: India.

Sufaida: India.

Tarse: India.

There were upwards of forty varieties of the mango cultivated in Java fifty or more years ago, according to Governor Raffles.

There are no accessible works on mango-culture, though Professor Whitner, in his "Gardening in Florida," devotes a small space to it, and articles on the mango occasionally appear in the leading agricultural papers in the State. In regard to the prospects for fruit, leaving frost out of account, it is probable that an occasional tree in this part of the State will produce a little fruit next year, but fruit in any considerable quantity need not be expected for two or three years at the least.

The oldest trees did not sprout from the root very generally after the freeze, though it is probable that, had they been cut down as soon as the amount of damage could be ascertained and the wound covered with grafting-wax, many more would have sprouted from the roots. The sap in frozen trees seems to sour and kill the live parts of the stem and roots in many cases.

2 BANANA AND PLANTAIN.

(*Musa*.)

Probably no one of the fruits classed as tropical, is cultivated over a greater extent of territory in the Gulf States than the banana. The reason for this is apparent. The plant is of easy culture, and if killed to the ground by a severe freeze, new and strong suckers soon appear from the roots, and in some cases will fruit the same year. It is found cultivated, therefore, in many places where fruit is not expected oftener than once every four or five years. Then, too, the plants will produce a moderate crop of fruit often when they have been deprived of every leaf by frost during the previous winter. Most banana plants that are in a strong healthy condition will stand a cold as low as 25° F. for a few hours without any further injury than a loss of leaves, and if the stalks are nearly full grown, a shortage on the head of bananas produced afterwards will result.

Indeed, the culture of the banana, as is well known, is universal throughout the tropical world, and in many places extends far outside of the tropics, as in the United States and southern Europe.

In the Gulf States the banana is met with from southern Texas to South Carolina, though it is often cultivated only for its grandeur as an ornamental plant. In Florida its culture for profit is carried on throughout the State with greater or less results. In the neighborhood of Live Oak and Lake City, when favorable season admits of the ripening of the fruit, it sells in most cases for as much as 5 cents per finger, a price greater than is usually realized in New York. At Orlando, and in Orange County generally, they are a comparatively sure crop. The grower sells wholesale at $1\frac{1}{2}$ and 2 cents per finger, and they retail at $2\frac{1}{2}$ cents each. At Manatee the price is 1 cent each, either wholesale or retail, and has not varied to any degree for the past six years. This is also the usual price along the coast as far down as Charlotte Harbor. At Chuckaluskee, Key West, and on Key Largo the price paid will usually average about one-half cent per finger, 20 to 25 cents per head, according to size and variety, and in Key West depending much upon the amount of fruit arriving from Cuba.

Extensive banana growing is not carried on farther north than Putnam County, and even in many parts of south Florida there are but few large patches, though nearly every one has a few plants. The largest growers are at Chuckaluskee, Key Largo, and along other portions of the southern coast and keys.

In the other Gulf States bananas are only occasionally seen. In lower Louisiana the fruit ripens after mild winters as far north as New Orleans, but is inferior to the West Indian fruit in quality.

The banana flourishes best in very moist rich soil, but will not endure standing water about the roots. In Florida the best possible location for a banana patch is on the banks sloping down to a lake, pond, or "bay-head." The springy nature of the soil in such a location agrees perfectly with the roots of the banana, provided they are not planted far enough down to be into standing water. Bananas may be cultivated, however, on high dry land of almost any description with more or less success. Methods of cultivation are as diverse as in the case of the orange tree, some being in favor of a deep and continuous mulching, others with cultivation like corn: still others set the banana plant in a hole 2 feet deep when doing the original planting. Location and soil, however, account in a great degree for these differences in mode of cultivation; different soils requiring different treatment. The banana growers of the lower keys produce fair results with no cultivation whatever except an occasional pulling of weeds and piling them around the plants. At Chuckaluskee the manner of cultivation is exactly like that of corn, though not quite so frequent. Excellent results usually follow heavy and often-renewed mulching.

There are no exhaustive works published in Florida on the culture of the banana, though a short space is devoted to it in "Whitner's Gardening in Florida" (published by C. W. Da Costa, Jacksonville, Fla.; also in Helen Harcourt's "Florida Fruits and How to Raise them," published

by J. P. Morton, Louisville, Ky.). Instructive articles often appear in the columns of State agricultural papers, among which was a valuable one by Mr. E. H. Hart in the Florida Dispatch for August 8, 1887.

The bananas in Florida, in most cases have pretty well recovered from the effects of the freeze of 1886, when they were generally killed to the ground above Charlotte Harbor. Last winter, however, was very severe in most parts of Florida, and the fruit in many localities was frozen, though the stalks were not killed. But little fruit has ripened yet this season, and from now on there will be the usual amount, unless frost prevents.

VARIETIES AND SPECIES.

The nomenclature of the many different varieties and species of the banana is as yet very much confused. The greater number of commonly-cultivated varieties, however, seem to belong to the species *Musa paradisiaca*. In common parlance, the plantain refers to such of these fruits as are improved in flavor by cooking; the name banana applying to those varieties which are esteemed best in the raw state. Most of the following varieties are growing or fruiting in Florida. While we do not claim that the classification is absolutely correct, it is as near so as can be determined without further years of comparison and examination.

✧ *Plantain* or *pisang* (*Musa paradisiaca*, type of the species).—This species is a native of India, but has been cultivated throughout the tropics of the Old and New World from time immemorial. It produces perfect seeds, according to Charles Kingsley and Dr. King, nowhere on the globe except on the Andaman Island, in the Bay of Bengal. It is always propagated by suckers, as are most of the edible species.

The leaves are spotted when the plants are young. The full-grown plant attains a height of 10 to 20 feet, according to circumstances. The fruit attains a length of 8 to 15 inches, and a bunch usually has on it from 40 to 80 "fingers" or fruits. The fruit is improved by cooking. It is a staple article of diet in the tropics. Tons of plantains meet with a ready sale in Key West and Tampa, but all are produced in Cuba.

The plantain has been fruited at Federal Point, Putnam County, by Mr. E. H. Hart, and on the lower keys, but it is rarely cultivated in Florida; the reason why it is not oftener grown is not apparent. Color of fruit, yellow.

Silk plantain.—Said to be a superior variety, grown in Cuba.

Orinoco (synonyms, Horse or Hog banana, El Bobo of Spanish America), *Musa paradisiaca*, var. *sapientum*.—The most common banana cultivated in the Gulf States; one of the most hardy of all, and for this reason often seen in cultivation. The fruit of this banana alone, of almost all edible varieties, can not be picked green and ripened away from the parent stalk without destroying its flavor. To have it in perfection it must be ripened on the stalk until the bananas turn yellow and are almost ready to drop off. The fruit is seldom shipped, and is of most value for home use and local markets. The fruit is shaped like

the plantain, though smaller, rarely more than 6 or 7 inches in length, and with more sharply-angular sides than most bananas. Leaves green, with no blotches. The plant attains a height of 15 or 20 feet with ordinary cultivation. Fruit yellow.

Baracoa (synonyms, Red Jamaica, Red Spanish).—Of taller growth than the Orinoco, and forms a most magnificent plant in favorable situations, attaining the full height of 20 feet or more. The entire stalk and mid-ribs of the leaves are of a rich wine-color; leaves are larger and of a more upright growth than those of the Orinoco. The fruit of this variety is the red or purple banana, so often shipped to the northern markets from the West Indies. It is very prolific, producing bunches double the weight of those of the Orinoco.

To obtain the best results with this variety the most of the suckers should be removed from the main stalk as they appear, thus throwing more vigor into the fruiting stalk or stalks. It is more tardy in blooming than most of the yellow-skinned sorts, and consequently not so valuable to grow in frosty localities, though it is often grown for its great beauty. As an ornamental plant it is perhaps not surpassed by anything in existence, unless it be the Abyssinian banana (*Musa ensete*). The Baracoa banana has stood as far north as Manatee, perhaps farther; but it is not yet in common cultivation in the State.

Hart's Choice (synonyms, Lady finger, Golden Early, Cuban, etc.), *Musa orientum*.—This banana has proved the best and most profitable variety for general culture in Florida yet introduced. Almost or quite as hardy as the Orinoco banana, it is said originally to have come from Abyssinia; but it has been grown for many years in the West Indies and Bahamas, and locally on the south Florida keys, where it was sometimes erroneously called the "Fig" banana. It was first brought into notice, however, in middle Florida by Mr. E. H. Hart, of Federal Point Putnam County (Florida's most enterprising pomologist), and to whom she owes the introduction of many other valuable fruits. Mr. Hart introduced it from the Bahamas, and finding it as hardy as the Orinoco, and much more desirable, brought it into general notice. In average seasons it bears fruit every year in the latitude of Putnam County. It is a small, delicate, yellow banana, with very thin skin, is very productive, and ripens quicker after flowering than most bananas. The edges of the stalk and mid-rib of the leaves are tinged with red, and the small plants never show the blotches on the leaves peculiar to some varieties. The plant is of dwarfish growth, usually measuring from eight to fifteen feet in height. The flavor of the fruit is spicy, rich, and delicious, and perhaps unsurpassed by any variety yet introduced. The fruit sells in the local Florida markets for almost double the price realized for the Orinoco.

Dwarf banana (synonyms, Chinese and Cavendish, *Musa Cavendishii*, Lambert; *M. regia*, Rumph; *M. Chinensis*, Sweet; *M. nana*, Loureiro.)—Probably first introduced by Mr. Atwood, of Saint Augustine,

about twenty years ago, though a few years later it seems to have reached Florida from the Bahamas, and from the Department of Agriculture at Washington about the same time.

Colonel Whitner, of Orange County, was probably the first to grow it on an extensive scale. The plant is dwarf-growing only in height; for, while rarely attaining a height of more than 8 feet and often not more than 5 or 6, the stalk will sometimes measure a foot in diameter at the base, and will support an immense head of fruit of from 75 to 200 "fingers." The fruit is yellow-skinned, longer than the Hart's choice, and with thicker skin. The flavor is fine, and the bananas ship well. The leaves of the young plants are spotted and blotched with red, as are those of the plantain and some other varieties. These blotches disappear as the plant increases in size. It is somewhat more tender as regards frost than the Orinoco variety. The Dwarf banana is a favorite in cultivation along our lower coast and keys on account of its short stocky growth, rendering it less liable to damage from hurricanes and high winds than the taller growing kinds. Chuckaluskee Bay, the Ten Thousand Islands, and Key Largo produce many bananas of this variety, which are marketed in Key West and along the Gulf coast as far up as Cedar Keys. The trade is carried on by means of small coasting schooners. During the past few years this variety has also been extensively planted out in the vicinity of Auburndale and Lakeland, Polk County, and in most cases is doing well in spite of unfavorable seasons.

Fig banana (Musa maculata).—There are many varieties known under this somewhat indefinite name. The true Fig banana, however, is said to be a small-fruited and delicious purple-skinned fruit, the stalk of the plant showing black spots and patches. Fruit very spicy, and of excellent flavor. A tender banana, not profitable for cultivation above south Florida.

Musa magnifica is described by Mr. E. H. Hart as belonging to this class (the "Fig" division). Mr. Hart had a specimen at Federal Point which put out a very large bunch of fruit, but which did not ripen on account of the approach of winter.

Date banana.—This is described as even smaller than the Fig banana, and of excellent flavor. It fruited in middle Florida several years ago.

Dacca banana (Musa dacca).—This is another dwarf species from China, which has been fruiting in European hot-houses since 1838. It is occasionally grown in Florida, and is described as follows by Professor J. N. Whitner :

Fruit small, averaging about 4 by 2 inches; flavor, delicious. The red stripe on the foot-stalk is broad, and a quantity of lime-like powder coats the stem and under side of the leaf;

Golden.—A tall-growing banana, introduced into the Florida keys from the Bahamas by John Gomez, of Pumpkin Key. It resembles the Hart's Choice on a large scale, the leaves and stalks being tinged with

red as in that variety. The fruit is of the size of an Orinoco banana, but more plump, and with blunt end. Flavor described as delicious, surpassing any variety grown on the keys. Fruiting at Chuckaluskee. Color of fruit, yellow.

Chumpa.—Described by Whitner as follows :

The stem of the leaf is tinged with red, which increases to a deep well-defined red along the central leaf-rib. Fruit of a pale straw-color when ripe, and about 6 inches long.

Brazil.—Plant said to attain a height of 20 feet, producing fine fruit, with a vinous flavor. Yellow-skinned.

Tahitia.—Fruit said to be yellow, turning black when ripe; slightly acid taste.

French Dwarf.—Locally grown in south Florida, and to all appearances identical with the common dwarf banana.

Tall French.—Tall-growing variety; leaves spotted while young. Very tender. Rarely grown above Charlotte Harbor.

Rand.—Fruiting in Orange County. Described as immensely productive.

"Apple" and "Silverskin" are local names, probably identical with some of the above varieties.

Large Fig.

Martinique.

The following additional list includes many varieties that are only ornamental, and many not yet introduced into Florida :

Musa Balbisana corniculata.—Described as follows by Von Müeller :

Insular India. Fruits as large as a good-sized cucumber; skin, thick; pulp, reddish-white, firm, dry, sweet; an excellent fruit for cooking. The Lubang variety is of enormous size.

Musa coccinea.—A Chinese species, with upright fruit-spikes.

Musa discolor.

Musa ensete.—The well-known Abyssinian banana; fruit not edible.

Musa Glauca.

Musa lancefolia.

Musa Livingstoniana.—Allied to *M. ensete*; mountains of Mozambique.

Musa Martini.

Musa ornata rosca.

Musa rosacea.

Musa Simiarum (syn. *Musa acuminata*, Coll).—This species is described as follows :

From Malacca to the Sunda Islands. About half a hundred marked varieties of this species, called mainly Peesangs in India, are under cultivation there. Though *Musa sapientum* is principally cultivated on the Indian continent, yet it never equals in delicacy the cultivated forms of *M. Simiarum*, the fruit of which sometimes attains a length of 2 feet.

Musa sapientum pruinosa.

Musa speciosa.

Musa superba.

Musa odorata.

Musa textilis. The Manilla plantain. Cultivated on the Phillipine Islands for the fibre it yields.—(H. E. Van Deman.)

Musa troglodytarum, Linnæus (syn. *Musa uranoscopus*, Rumph—Said to be indigenous to India and to the Pacific islands. The fruit-stalk of this species stands upright; "fruits edible, small, reddish or orange-colored; pulp yellow, mawkish." This species was in Mr. Bidwell's collection at Jacksonville a few years ago.

Musa vittata.

Musa zebrina.—Grown as an ornamental plant.

ALLIGATOR OR AVOCADO PEAR.

(*Persea gratissima*; *Laurus persea*, Linn.)

The "Aguacate" of the Spanish West Indies, the "Palto" of Brazil; often known as "midshipman's butter." This is a large tree of tropical America, known in Florida for many years. The first trees on the west coast were planted many years ago by Mr. Joseph Robles, of Tampa. These had attained large size, and were badly injured by the freeze of 1868. From that time until 1886 no serious injury from frost occurred to the large trees in Tampa, but in 1886 they were killed to the ground, large and small, without exception. Even trees of 30 or 35 feet in height with trunks a foot to 18 inches in diameter, were killed back.

On Point Pinellas the first seeds were planted by Captain Miranda, in 1866. From these four trees attained maturity, and were the parents of nearly all that were afterwards planted on the point.

They usually bore the fifth year from the seed, and when in full productiveness it is estimated that they will yield about five hundred fruits each. The trees which were bearing on the point in 1885 were sixteen or eighteen in number. Besides, there were many younger trees in various stages of growth and doing well. The freeze was not quite so fatal to these trees as to the mango. Very few, indeed, of them were uninjured, but with hardly an exception the trees which were bearing have sent up more or less vigorous shoots from the old roots, and it is hoped that some of them may have fruit in a year or two.

The fruit sold on the spot or in Tampa at from 75 cents to \$1 per dozen. None had yet been shipped.

The younger trees have many of them recovered and others have been planted. There are at present about 300 or 400 growing on the Point.

In the Manatee region there were one or two bearing trees and many more of large size about ready to bear. Nearly every one had a few small trees. All were killed to the ground, but sprouted from the roots vigorously in the spring.

Below Charlotte Harbor they were uninjured by the cold. Mr. Collier, at Marco, has probably the healthiest and best orchard of Avocado pears in the State. The trees are planted on high, rich, shell mounds, which soil agrees with them perfectly, as also does any high, rolling, rich location, especially when the yellow subsoil is found. Mr. Collier

markets his fruit at Key West and in Charlotte Harbor. On Key Largo there are many bearing orchards of young Avocado pears, but none are as healthy as those grown on a deeper soil. A tree is said to have attained a large size at Palatka previous to the freeze, while small trees were occasionally met with in other parts of middle and south Florida.

The fruits of the Avocado pear are very large, pear-shaped, of a brown or purple color, and in the common variety brown. They are of one or two pounds' weight. The pulp is of a greenish yellow color, is from half an inch to an inch thick, and incloses a very large heart shaped or round seed, the seed itself being often as large as a good sized apple. The taste of the pulp is compared to that of beef marrow. It is eaten with salt and pepper, sometimes with the addition of butter or oil, sometimes with wine, and sometimes it is used as the basis of a salad, for which use it is steadily gaining in popularity in New York.

The fruit ships well, and is every year shipped from the West Indies to New York, where they retail at from 20 to 40 cents each. It is stated that while ten years ago there were not more than 100 fruits brought to New York in the course of a season, at present the sales of only one firm average from 300 to 500 fruits per week during the season, from June to November. It is said that an indelible ink can be prepared from the seeds which no known acid can remove.

The leaves of the Avocado pear are very large, somewhat resembling those of the Spanish chestnut, and very ornamental. The new growth is a rich wine-color. The seeds are very perishable, and if shipped any distance must be packed in dry sand.

The tree has been fruited in European hot-houses, and it is probable by means of glass only (without fire heat) it could be fruited in this way in many of the Southern States.

VARIETIES

Brown.—The commonest sort.

Purple.

GUAVA.

(*Psidium*.)

The guava has been styled the "Apple of Florida," and its presence was never more missed than last summer, after the disastrous freeze of 1886. Except the hardy varieties, Cattley and Chinese, nearly all the guava trees in the State above the Caloosahatchee were killed to the ground at that time.

The best authorities agree that tropical and subtropical America is the original home of most species of the guava. The fact remains, however, that the Cattley guava was first introduced into England from China in 1820, though it is possible that this species and Yellow Cattley or Chinese guava was first carried from Brazil to China be-

fore their introduction into European hot-houses. The Guinea guava, too, is said to be so named from the country of its nativity.

The common guava (*Psidium guayava*, Raddi; *P. pomiferum*, and *P. pyriferum*, Linn.), was first introduced into south Florida by Col. H. V. Snell (now of Gainesville, Fla.), in 1847. Colonel Snell brought the ripe fruits from Havana and planted the seeds at Sarasota. The original trees are still standing (or rather the roots, as the tops have been frosted down two or three times), near the residence of Mr. Whitaker, on Sarasota Bay. In 1848 Colonel Snell brought more fruit, the seeds from which were planted in the Gates grove, at Manatee village. These original roots, too, still exist. The guava of this species is now common all over south and middle Florida, in endless variety of flavor, size, shape, and vigor; pear shaped, apple-shaped, large, small, pink, yellow, and white fleshed; with flavor like that of a strawberry to that of sawdust and vinegar; full of seeds, and almost entirely seedless. Indeed, there is a great field before us for the selection, improvement, and hybridization of the varieties of the guava. It is probable that the guava of the future will be as much superior to these varieties as the Bellflower or Carolina June is superior to a crab-apple. So far almost nothing has been done.

On Point Pinellas and at other places on Tampa Bay, on Charlotte Harbor, and more particularly at Manatee and Sarasota, the guava has become naturalized. The streets of Manatee village have a reputation as "guava thickets," and in the surrounding hammocks the trees are frequently met with. Guavas are plentifully cultivated in Orange, Sumter, Polk, and Lake counties, and in fact almost everywhere as far up as Jacksonville. At Fort Gatlin, near Orlando, there is a guava-jelly factory. The guava is also grown on the lower keys; but though never injured by frost, they are not so healthy as those grown on the sandy land of the main-land.

The leaves of the guava are evergreen, varying much in the different species and varieties. Of the common species the leaves are about the size and shape of a large apple leaf, are of a rather light green, thin, and roughish on the under side.

The foliage of the Cattle and Chinese guavas is much darker green, thick and shining like the leaves of a camellia, and at first sight not much resembling those of the common guava.

The flowers of the guava are white, handsome, and fragrant, and produced in the axils of the leaves.

The fruit, as before remarked, varies widely even in the same species, but in most cases is characterized by a peculiar aromatic or musky flavor not liked by the novice at first, but after a longer acquaintance with the fruit is not noticed. It is eaten and prepared in almost every conceivable way—raw from the tree; cut up with sugar, or sugar and cream; stewed, canned and preserved; made into pies, puddings, dumplings, and all the delightful compounds concocted by the good house-

keeper and appreciated by the "small boy," while the jelly and marmalade made from it are famous the world over.

The guava is free from insect enemies so far as we know.

At many places in south Florida the guava has heretofore never been thought worth cultivating for profit, but bushels of fruit have been allowed to waste. At Manatee, for years previous to the freeze, guavas were given away in any quantity to any one who chose to pick them up, while they were picked and sold at 25 cents per bushel. Hundreds of bushels went to waste every year for lack of some one to use them, and some seasons there were even more than the hogs could eat. They usually sold at 50 cents per bushel in Tampa, from 50 to 80 cents in Orlando, 50 cents per bushel was given in Fort Gatlin at the jelly factory, and \$1.50 and \$2 per bushel in Cedar Keys and Jacksonville.

The guava succeeds on almost any kind of land, is one of the most prolific fruits known, and its extensive culture could be made highly profitable in south Florida if only enterprise and capital could be attracted in that direction. Below Manatee it seldom freezes down, and when it does it invariably sprouts more vigorously than ever from the roots, and produces fruit again the second summer after. There were guava trees in Manatee 30 feet high previous to the freeze of 1886, and they had not been frozen down before in seventeen years. Owing to more heavy frost last winter the guava crop this summer is very light, there being no fruit at all except in favored localities naturally protected by bodies of water on the north or northwest. It is a strange fact, that while during the freeze of 1886 the thermometer sunk much lower in Orange County than on the west coast between Tampa and Charlotte Harbor, on the other hand, the frosts of last winter were much more severe along the west coast than in the lake region of Orange County; and it was even as cold at Chuckaluskee Bay as at Orlando.

The jelly factory at Fort Gatlin is not running this summer, but if a mild winter follows it will doubtless be in operation next season. The guava fruits frequently in southern Texas and Louisiana.

SPECIES AND VARIETIES.

The following species and varieties of the guava are cultivated at present in Florida:

Common (*Psidium guayava*, Raddi).—This includes the White or Pear guava (*Psidium pyrifera*, Linn.), Red or Apple guava (*Psidium pomiferum*, Linn.).

Countless varieties and hybrids of these occur in Florida, many of the best of which will be named by the Florida Horticultural Society.

Saparaupur, *Large Round*, and *Calcutta* are recently-introduced varieties of this species.

Strawberry is a local name for a choice variety.

White winter guava.—Very distinct. Common in the Clearwater and

Dunedin district, Hillsborough County. Very large, 3 or 4 inches in length; pear-shaped; neck entirely free from seeds, and but very few contained in the thicker part of the pulp. Unsurpassed for canning, as the seeds can be removed like the core of an apple. Never ripens before November, and likely to prove very valuable on this account.

The nomenclature of the many distinct varieties of the species *P. guayava* has been taken up by some of the south Florida nurserymen, notably Mr. R. D. Hoyt, of Bay View, and it is probable that in a year or two the list of varieties of guavas will number one hundred or more, these, too, only the "cream" of the countless varieties more distinct than the named varieties of apples or oranges; distinct in color, shape, flavor, size, quality, and productiveness of fruit, in the foliage and many other details.

Guinea guava (Psidium Guiniense).—The foliage of this species resembles that of the common guava somewhat, but the leaves are broader and not so long. It has not yet fruited that we know of in Florida. It is said to be a native of Guinea, and produces quantities of fruit an inch in diameter, and of exquisite flavor.

Psidium aromaticum.

Psidium cujavillus.

Psidium araca.—A distinct and delicious guava, native of Brazil. Fruit very large, and seeds double the size of those of the common guava. Foliage distinct.

Cattley guava (Psidium Cattleyanum).—Also known as the Purple Guava. One of the most hardy species; uninjured by the freeze of 1886 as far north as Orange County. The common variety of this species is about an inch in diameter, of a fine claret color, and with a flavor resembling that of a strawberry. In California this species is frequently called the "strawberry" guava. Likely to be held in better repute by those of the North, to whom the "musky" flavor of the ordinary guava is objectionable. As a jelly fruit too it is said to surpass the common guava. This species is grown in rows, like the currant, from 4 to 8 feet apart. Foliage thick and shining, resembling that of the camellia. It is being planted out to quite an extent at present. One gentleman near Orlando has recently set out three hundred plants. The crop of this species was fair last summer and very heavy this summer. Mr. E. H. Hart, who has grown the Cattley guava for many years, tells us that it can be much improved by selection of seeds even in a few years. *Adam's Purple* guava seems to be an improved variety of this species.

Yellow Cattley, Chinese or Commercial guava (Psidium Chinense).—Another valuable hardy species, producing yellow fruit of larger size, but much resembling the Cattley guava. Foliage almost identical with that of the Cattley. "Introduced many years ago by Mr. Bliss, who founded the colony at Aurlantia."

The following species are native of Central and South America, and most of them yet remain to be introduced into Florida. Descriptions are from Von Müeller:

Psidium acidum.—"Higher regions on the Amazon River. A tree at maturity 30 feet high; its fruit pale yellow and of apple size."

Psidium arboreum.—"Brazil; province of Rio de Janeiro. Fruit of about 1 inch in diameter, and of excellent flavor."

Psidium chrysophyllum (*Abbevillea chrysophylla*, Berg.)—"The Guabi-roba Do Mato of southern Brazil." The tree attains a height of 30 feet. Fruit, the size of a cherry.

Psidium cinereum.—Brazil; provinces Minas Geraes and Sao Paulo.

Psidium cordatum.—The Spiel guava; West Indies.

Psidium cuneatum.—Brazil; province Minas Geraes; fruit greenish, of plum size.

Psidium grandifolium.—Brazil; provinces Rio Grande do Sul, Paraná, Sao Paulo, Minas Geraes. A shrub of rather dwarf growth; berries, the size of a walnut.

Psidium incanescens.—Brazil; from Minas Geraes to Rio Grande do Sul. Attains a height of 8 feet

Psidium lineatifolium.—Mountains of Brazil. Berry 1 inch in diameter.

Psidium malnifolium (*Campomanesia malnifolia*).—Uruguay. Berry 1 inch in diameter.

Psidium polycarpon.—Trinidad; Guiana to Brazil. "A comparatively small shrub, bearing prolifically and almost continuously its yellow berries, which are of the size of a large cherry and of exquisite taste."

Psidium rufum.—"Brazil, in the province of Geraes, on subalpine heights. This guava bush gains finally a height of 10 feet, and is probably the hardiest of all the species producing palatable fruit."

GRANADILLA.

(*Passiflora edulis*.)

Granadilla is a name which seems to be applied almost indiscriminately to all the edible fruited species of the Passion vines. This species was originally a native of Brazil. The leaves are three-lobed and glossy, and the vine makes an extremely quick growth, often bearing fruit when two years old. The petals of the flower in this species are white; crown whitish, with a blue or violet base. The fruit is as large as a goose egg, of a purplish color, and contains a pulp filled with numerous small seeds; the pulp is jelly like, and of quite pleasant taste. The Granadilla is frequently met with in south Florida, having fruited freely in Orlando, Dunedin, and at other points. The freeze of January, 1886, seriously injured the plants, but in some cases they recovered so quickly as to produce fruit the same year, and this summer are fruiting freely. The Granadilla grows very fast, sometimes covering a space as

much as 15 feet square in its second year. It might be cultivated extensively in south Florida, as the vine will stand hard frosts unharmed.

The Large Granadilla (*Passiflora quadrangularis*) is a scarcer species than *P. edulis*, and is also a native of Brazil. It produced fruit as far north as Dunedin previous to the freeze, but nearly all of the large vines in the State were entirely killed at that time, as it is a much more tender plant than the former. The stems of the plant are four-sided, with wing-margined angles. The leaves are 4 to 8 inches long, ovate or slightly cordate, and bright green. The flowers are bell-shaped, fragrant, and about 3 inches long; in color they are crimson purple, with the violet or blue crown variegated with white. The fruit is described as follows by Mr. Thomas P. Frank :

The fruit looks like a small oblong light-green water-melon, but when perfectly ripe assumes a yellowish color, and is usually about 5 inches in diameter by 8 long. Inside are the seeds, about the size of those in a cantaloup, and a large amount of very pleasant slightly-acid juice.

The plant is not yet cultivated in Florida to any great extent. The insect enemy of the Passion vines is a small yellow-and-black caterpillar, and all young plants need watching.

BARBADOES GOOSEBERRY.

(*Perezkia aculeata*.)

This is a climbing, or shrubby, cactus, with true leaves. It is quite frequently met with in cultivation in south Florida, where it is grown as an ornamental plant, or as a stock upon which to graft epiphyllums and other dwarf cacti. The berry-like fruits are edible, but the plant is not often cultivated for its fruit in Florida.

PEPINO (SYNONYMS, MELON SHRUB, OR MELON PEAR).

(*Solanum Guatemalense* ?.)

This edible-fruited *Solanum* was introduced into Florida and the Southern States two years ago from California, by one of whose nurserymen (the late Mr. Grelech, of Los Angeles) it was introduced from Guatemala. A more suitable name than "Melon shrub" is its native name, Pepino, as such names as the former often lead to confusion. Though introduced under the name *Solanum Guatemalense*, it seems to correspond almost exactly and is probably identical with *S. muricatum* and *L'Heritier*, of Peru. We give below the description of the original introducer, as it is probably a good description as it grows in California :

The Melon shrub, as it grows in the Central American high-lands, is, as the name defines it, a shrub. It reaches at its best 2 or 3 feet each way, but is generally smaller, and recalls in many respects the Chili pepper vine, the tomato, or the nightshade. The flowers resemble those of the Chili pepper, are very numerous and of a beautiful violet color, and are most charming when used in floral decorations. The

plants should be set in rows 4 feet apart and 2 feet in the rows. A month and a half after being set out the fruit will begin to set, and in three months after planting the fruit will ripen and continue to ripen until checked by frost. The fruit is of the size of a hen or goose egg, or even larger, and very much of the same shape. The color is lemon or pale orange with streaks or waves of bright violet, the whole making a fruit unrivaled in beauty. The interior of the fruit is a solid pulp similar to that of a pear, also of a pale-yellow color, and of a taste resembling that of a fine muskmelon, but which has besides a most charming acid, so wholesome and so delicious, that when the fruit is partaken of on a very warm day it allays the thirst for several hours. The plant is an enormous yielder. I have seen plants of small size, say 2 by 2 feet, bear 30 large fruits, which from their size and weight pressed the branches to the ground, and thus formed a most beautiful border all around the plant.

The Melon shrub can stand light frost, but heavy frost will cut it to the ground. The dead branches should then be cut off, the plants covered with an inch or so of straw, and it will, if so protected, start up in the spring as vigorously as before.

Having decided upon the merits of this plant and its fruit, and being satisfied that it will become a most welcome addition to the fruit not only of California but of all the Middle and Southern States of the Union, we decided to bring the same with us to California and try it here. After a good deal of trouble, and I must say no little expense and anxiety, we have now eminently succeeded. Our experience has been, we think, most valuable to us. The Melon shrub grows in California even better than in Central America, and the fruit is decidedly superior.

The cultivation of the Pepino in Florida has not produced such favorable results as were hoped for at first. The plants grow exceedingly well in the cool spring and fall weather, but if frosted down in winter they do not display the remarkably hardy traits claimed for them in California. This would scarcely be of great disadvantage, as young plants could be set out in the spring and would fruit the same year, other things being favorable. But in the warm rainy weather of our Florida summers the Pepino languishes, and at that time is very liable to the attacks of that sworn enemy of the *Solanums*, the leaf-roller. Then "eternal vigilance is the price of fruit," and sometimes of the life of the plant.

The Pepino requires well-drained land, and the new system of sub-irrigation is recommended by some as being beneficial, but in no case must the water be allowed to stand for any length of time around the roots of the plant. In a few cases complete success is reported with this fruit in Florida. Mr. J. H. Hurst, Lake Helen, Volusia County, has successfully fruited it, as has Maj. A. J. Adams, of Manatee, and others.

As a rule all *Solanums* like a cool though frostless temperature. In this respect they are much like the *Cinchona*. It seems to us that a thorough trial of the Pepino should be made (growing it as an annual) in the cool mountain region of western North Carolina and north Georgia.

The Pepino is usually seedless, and is propagated from cuttings, which strike easily. A supply could easily be wintered indoors, from which an abundant supply of cuttings could be taken in the spring, and the plants from these, with good care, would fruit in summer and fall.

TREE TOMATO OF JAMAICA.

(*Solanum betaceum*, *Cyphomandra betacea*.)

This plant is really a native of Central America instead of Jamaica. It is grown as far south as Buenos Ayres and Valparaiso, also in the Mediterranean region in Europe, for the sake of its tomato-like berries. The following description is condensed from that of Mr. D. Morris, now assistant director of Kew Gardens, London :

The plant is of shrubby habit, growing 5 or 6 feet high, with large shining leaves, often a foot long. The flowers are fragrant, of a pale flesh color, with yellow stamens, followed by fruit the shape and size of a hen's egg, at first of a purple tint, but gradually assuming a warm reddish color as it ripens. It answers in every respect the purposes for which the ordinary tomato is esteemed. The plants come into bearing in two years. "If the fruit is allowed to ripen on the plants it may be eaten raw, when it has a gooseberry-like flavor. If the skin is removed and the fruit (without the seeds) stewed with sugar, it resembles an apricot, but with a slight subacid flavor that is very refreshing."

In Florida the remarks applicable to the Pepino will apply pretty well to the Tree tomato. It is fruiting this summer, however, and doing exceedingly well for Mr. A. A. Marsh, of Orlando, Fla., and perhaps in other localities. Its value as a fruit plant for Florida is of course not yet well determined.*

HOG-PLUM, OR JEW PLUM OF THE WEST INDIES.

(*Spondias dulcis*.)

This species, or perhaps a closely-allied one, *Spondias lutea*, is highly prized as a fruit-tree in Key West and on the lower islands, and has produced fruit on the Manatee River.

The fruit is red, or with a yellowish tinge, and is of the size, shape, and taste of a plum. It is of a delicious subacid taste, in fact one of the best of West Indian fruits. The tree is deciduous, the fruit appearing along the branches in spring before the leaves come out. The fruit ripens in summer, from May to July; inside the pulp is a very large rough seed, which however seldom germinates; the tree being almost altogether propagated from cuttings. The Hog-plum is known as the "Mombin" in the French West Indies, and as the "Tapereiba" in Brazil. The tree is of quick growth, produces fruit when very young, and if frozen down sprouts up again readily from the roots. It will probably in time be cultivated extensively in south Florida, as it deserves.

TAMARIND.

(*Tamarindus Indica*.)

This handsome tree, a native of India, is grown almost universally throughout tropical countries at the present time. In the United States it is grown only in south Florida, and specimens are occasionally met with

* Specimens from Mr. Marsh sent to me were of a delicate purple color, and quite agreeable tomato flavor.—H. E. VAN DEMAN.

on the Gulf coast of Louisiana. In Key West it is the most common street tree, and it there reaches a very large size. It is also quite common on the keys and up along both the east and west coasts, having produced fruit as far north as Clearwater Harbor. Nearly all trees in the latitude of Manatee and Tampa were killed down—some entirely killed—by the “big freeze.” Previous to that time many had been bearing for years. One tree at Manatee when killed measured exactly 4 feet in circumference at the base. The tree has handsome pinnate acacia-like leaves, which, like most acacias and albizzias, etc., close at night. The flowers are small, of a pinkish-white color, followed by pods inclosing a pleasant acid pulp, much used, when preserved in sirup or sugar, as a basis of a cooling drink, and in medicine being rich in formic and butyric acid.

So far as we know the tree has no insect enemies, though sometimes the fruit becomes wormy and worthless late in the season. If care is taken not to break the shell-like pod inclosing the pulp tamarinds will stand any amount of shipment, and keep good from one to three months after picking. There is no reason why tamarinds might not be had in any and every market of the United States for many months during the year. They are ordinarily shelled, the pulp packed in casks, over which boiling sirup is poured until the cask is full, then, after cooling, the cask is headed up, and is then ready for shipment. There is but one variety known in America, with a comparatively short pod and acid pulp, though two other varieties are described as native in India.

TROPICAL ALMOND.

(*Terminalia catappa*.)

The tropical almond (or *Almendro* of the Cubans) is a common tree in Key West, and previous to the freeze good-sized specimens were growing up as far as Tampa Bay on the west coast, but these were at that time completely killed.

It is a magnificent tree, attaining a height of 60 or 70 feet, and with large oblong leaves, which at many seasons of the year are richly colored yellow and scarlet—“autumn leaves without frost.” The edible seeds ripen in July and August. The tree is described as follows by Charles Kingsley:

The tropical almond, with its flat stages of large smooth leaves, and oily eatable seeds in an almond-like husk, is not an almond at all or any kin thereto. It has been named, as so many West Indian plants have, after some known plant to which it bore a likeness, and introduced hither, and indeed to all shores from Cuba to Guiana, from the East Indies, through Arabia and tropical Africa, having begun its westward journey probably in the pocket of some Portuguese follower of Vasco de Gama.

The tree is not likely to become much cultivated in Florida except as an ornamental tree, and that not to a great extent, as it is more tender than many of the other tropical trees.

TRIPHASIA TRIFOLIATA.

This unique little shrub, of the Citrus tribe, is sometimes known as the "Bergamot" (but incorrectly), and the preserved berries are occasionally shipped from the West Indies as "lime berries." It is frequently used in Key West as a hedge plant, and fruits there freely. It was also occasionally seen in Tampa previous to the freeze. It is a thorny little shrub, with trifoliate dark-green leaves, but should not be confounded with *Limonia* (or *Citrus*) *trifoliata*, from which it is entirely distinct. It is a native of southern China, but is now said to be naturalized in India, and to some extent in the West Indies. The fruits are of the size and shape of gooseberries, with a reddish or wine-colored skin, each containing one seed. When fully ripe they have an agreeable sweet taste, and are sometimes preserved in sugar or sirup. It is of value principally as an ornamental plant, or hedge plant. It seems to be as hardy as the lime.

THE HOG-PLUM.

(*Ximenia Americana*.)

This small tree is a native of tropical America, Florida, northern Mexico, middle and south Africa, southern Asia, and north Australia. It is the "*Alvarillo del Campo*," of Mexico, the "*Amatunduluku*" of Natal. It is quite common in south Florida, but is not cultivated. It is mentioned with the idea of drawing attention to it as worthy of cultivation with a view to improvement. The fruits are about an inch long, of the shape of a plum, and when ripe the pulp surrounds a very large seed. The fruits are eaten generally wherever the tree grows, but no attempt seems to have been made to bring it into cultivation. The tree is not ordinarily injured much by frost south of Tampa Bay.

TROPICAL FRUITS RECENTLY INTRODUCED INTO FLORIDA—PROBABLY NOT YET FRUITING IN THE STATE AND BUT LITTLE KNOWN.

[We quote descriptions when practicable, and give occasional notes as to growth, etc.]

Antidesma Bunins, Spr.—"A native of Java and the neighboring islands, furnishes small, fleshy, berry-like fruits, of a bright-red color, ripening into black; they have a sub acid taste, and are used chiefly for preserving." (J. R. Jackson, curator museum Royal Gardens, Kew.)

This plant grows off exceedingly well, but its hardiness is not yet tested in Florida.

Antidesma ghoesembilla,
Anona aurantiaca,
A. Africana,
A. amplexicaulis,
A. Asiatica,
A. cineria,
A. hexapetala,
A. longifolia,

A. Mexicana,
A. muscosa,
A. macrocarpa,
A. maratima,
A. paludosa,
A. palustris,
A. piriformis.

A. reticulata (the true Custard-apple, or Bullock's heart, of Central America and the West Indies).—This celebrated tree grows exceedingly well in south Florida, and will probably become as popular as the sugar-apple, to which it is preferred by many. It is not yet fruiting in Florida that we know of. The fruit is thus described by Mr. Thomas P. Frank :

The Custard-apple is not so likely to suit every one as the mango. To my taste it is unequalled by anything. When full the fruit will keep about three days before attaining its best flavor, when it should be as soft as a ripe Kaki. One of the largest and best I ate was so soft that the stem (which was from $\frac{1}{4}$ to 1 inch in diameter and reached half through) had pulled out in attempting to lift it. The fruits will average about 3 inches in diameter, nearly round, slightly conical. I had one $12\frac{1}{2}$ inches in circumference the smallest way, and saw one on the tree much larger. The outside is smooth, with slight depressions all over, such as a person's thumb would make in handling a chunk of putty, but close enough together to entirely cover the fruit. When ripe they are a dull yellow, with more or less brownish russet, though some are all yellow but with a pinkish red cheek, and are very handsome. Inside is a smooth soft substance about the consistency of good ice-cream; about three-fourths of an inch next the skin is entirely free from seeds, pulp, or fiber; this can be eaten off with a spoon, and dissolves in one's mouth about as readily as the above popular dish. The balance is milky white, and the seeds scattered through it are about one-fourth by one-half inch. There is some pulp to this part, but it adheres to the seeds, so does not interfere with the full enjoyment of eating. Although very sweet and without a trace of acid, the flavor is delicious, not at all sickish even at the first trial.

In Brazil the *Anona reticulata* is called "Fruta da Conde."

Anona suavisissima.

Anona trilobata.

Anona — ? (the "Beriba" of Brazil).—A quick-growing *Anona*, "with large fruit, the inside of which tastes very much like the filling of cream cakes."

Adansonia digitata.—"The celebrated 'Baobab,' a native of the western coast of Africa, and also of Egypt. In the former country it is described by Adanson as being a tree of large dimensions and economy; the trunk growing to the height of 12 or 14 feet, but of the vast circumference of 60 or 70 feet, the lateral branches growing to the length of some 40 or 50 feet, of the thickness of a great tree, their remote branches touching the ground, while some of the roots that had been laid bare were upwards of 100 feet long, and then they were not exposed their full length. The fruit is from 9 to 12 inches long, and about 4 in diameter, of a brownish color, and rather pointed towards the extremities. The pulp is a little farinaceous, mixed with fibers; when fresh it has a very refreshing acid taste, and when eaten with sugar it is both pleasant and wholesome. It retains its cooling properties when dry, and on that account the physicians of Cairo administer it in fever and other diseases." (Rhind.)

The Baobab is also known as Monkey's Bread. It is a tender tree, and not likely to prove of value above Charlotte Harbor. Maj. A. J. Adams, of Manatee, was among the first to introduce it to Florida several years ago.

Artocarpus incisa, *A. communis* (the Bread-fruit tree).—"That awkward-boughed tree, with huge green fruit, and deeply-cut leaves 1 foot or more across, leaves so grand that, as one of our party often suggested, their form ought to be introduced into architectural ornamentation, and to take the place of the Greek acanthus, which they surpass in beauty—that is of course a Bread-fruit tree." (Kingsley.)

"The Bread-fruit tree is the great gift of providence to the fairest isles of Polynesia. No fruit or forest tree in the north of Europe, with the exception of the oak or linden, is its equal in regularity of growth or comeliness of shape; it far surpasses the wild chestnut, which somewhat resembles it in appearance. Its large oblong leaves, frequently a foot and a half long, are deeply lobed, like those of the fig-tree, which they resemble not only in color and consistence, but also in exuding a milky juice when broken. About the time when the sun, advancing toward the Tropic of Capricorn, announces to the Tahitians that summer is approaching, it begins to produce new leaves and young fruits, which commence ripening in October, and may be plucked for about eight months in luxuriant succession. The fruit is about the size and shape of a new-born infant's head." (Hartwig.)

The tree also grows throughout the West Indies and southern Central America, where it attains immense proportions, the trunk often being from 10 to 12 feet in girth, and the branches reach out so as to cover a circumference of 100 or 150 feet. The fruit is prepared for eating by splitting it open, putting a small piece of fat salt pork in a natural cavity in the center of it for shortening and seasoning, and then baking it. The taste suggests something like a cross between bread and potato. The fruit of most varieties is seedless, and the tree propagated with difficulty from layers, except in the case of an old tree, which suckers from the root. According to Von Müeller, the fibrous bark can be beaten into a sort of rough cloth, the light wood used for canoes, and the gum issuing from cuts made into the stem, for closing the seams of canoes.

The Bread-fruit tree is very rarely seen in Florida; it is very tender, and though specimens have passed the winter safely as far north as Manatee in the open air in one or two cases, it is hardly likely to succeed north of the Caloosahatchee, unless as an ornamental tree with winter protection.

Actocarpus integrifolius.—The Jack or Jaca tree, is a little more hardy. There are but few specimens in the State. Mr. Bidwell, at Orlando, has a healthy young tree, which was killed back to the ground, however, by the freeze of 1886. The tree is a native of India, where it ascends to the elevation of 4,000 feet. For description, see Whitner's "Gardening in Florida."

Averrhoa carambola.—"Continental and Insular India. Not hurt by slight frost except when very young. Sir Joseph Hooker found this small tree on the Upper Indus as far as Lahore. The fruit occurs in a

sweet and acid variety; the former is available for the table raw, the other for preserves." (Von Müeller.)

This fruit is also valued for making pickles. The leaves are compound and quite handsome.

Averrhoa Bilimbi (the Blimbing).—Closely related to the above fruit, and valued for the same purposes. The young plants are stronger growers than those of *A. carambola*.

Ægle marmelos.—The Elephant Apple, Maredoo or Bengal Quince of Continental India (Schleim), Appel-boom of the Dutch East Indies. A tree closely related to the Citrus, with tri-foliate leaves, and a lemon-like manner of growth. Will stand light frosts.

Caryocar nuciferum.—The Souari-nut of South America.

Carica Candinamaricensis.—Resembles in foliage the ordinary native pawpaw of the north (*Carica papaya*).

Carica cauliflora.

Carissa acuminata.—Native of Natal and Zululand.

Deltonia lutea.—Native of Brazil, where it is called the "Capuassu." "It is a medium-sized tree, with immense thick foliage, so that in a grove of them it would be dark at noonday. The blossoms are small; the fruit an immense oval vessel, but often nearly round; a hard woody shell covered with a russet furze; inside, a yellow mass of pulp surrounding the immense seeds. When ripe, one of the fruits will most deliciously perfume the whole air. The flavor it is impossible to describe, but to drink the "wine of Capuassu," which is simply the pulp washed off in water and strained, with a little sugar added, is worth a voyage across the Atlantic." (Edward S. Rand.)

Eugenia Australis.

Eugenia Brasiliensis.

Eugenia pimenta (the Allspice tree).—Grows well, and blossomed at Manatee previous to the freeze.

Eugenia Willdenovii.

Eugenia zeylanica.

Eugenia uniflora.—Brazil. Fruit of cherry size. Will probably prove hardy.

Feronia elephantum.—A fruit of considerable note; a native of northern and central India.

Garcinia pictoria.—A near relative of the famous mangosteen. Leaves very large and thick. New growth light wine-color.

Glycosmis pentaphylla.—Native of India.

Guilielma speciosa.—The "Peach palm" of the Amazon, known to the Indians as the "Pirijao." It is described as follows by Wallace in his "Palms of the Amazon":

This most picturesque and elegant palm has the stem slender, cylindrical, and thickly set with long needle-shaped spines disposed in rings or bands. It reaches 60 feet in height and grows quite erect, though in exposed situations it becomes curved and waving. The leaves are very numerous, terminal, pinnate, and drooping, forming a neat spherical crown above the stem; and the leaflets growing out of the midrib

in various directions, and being themselves curled and waved, give the whole mass of foliage a singularly plummy appearance. The fruit is the size of an apricot, of a triangular oval shape, and fine reddish-yellow color. In most instances the seed is abortive, the whole fruit being a farinaceous mass.

The fruits are said to be eaten either boiled or roasted, and have a flavor combining that of roasted Spanish chestnut and sweet-potato. They are also said to be ground up into flour and made into cakes, which are roasted like cassava bread; or the meal is fermented in water, and forms a subacid creamy liquid. The fruit is said to stand twenty to thirty days of transportation when ripe.

Lucuma cainito.—The “Abio” of Brazil. “The fruit is of a clear orange-yellow, with a smooth skin like a nectarine, and one of the best fruits we have here in Brazil. It is also a very handsome ornamental tree. In size the fruit varies from that of a large plum to that of an apple, and I have seen it in eastern Peru as big as a small melon.”—(Edward S. Rand.)

Mimusops Elengi.

Myrtus ugin (Chilian myrtle).—“Has long been valued in its native country for the sake of its fruits, which are of brownish-red color when ripe, and about the size of a large black currant. It has a soft juicy pulp, with a sweetish and somewhat aromatic flavor. It is described as being cultivated in gardens and used as dessert in Valparaiso, and the expressed juice of the fruit mixed with water is said to form a very refreshing drink, having an odor of rosemary.” (John R. Jackson)

Perhaps more suitably classed as semi-tropical, as it will doubtless prove hardy in Florida.

Nephelium litchi (the Litchi or Leechee).—“A small insignificant tree, with lanceolate leaves and small greenish-white flowers, is a native of China and Cochin-China, but its cultivation has extended over the East and West Indies. The plum-like scarlet fruit is generally eaten by the Chinese with their tea, but it is also dried in ovens and exported. In order to obtain the fruit in perfection for the use of the imperial court, the trees, as soon as they blossom, are conveyed from Canton to Peking on rafts at a very great trouble and expense, so that the plum may just be ripe on their arrival in the northern capital.” (Hartwig.)

“In this country we know the Litchi only in its dried state, that is, when the outer warted shells have become woody, and the inner pulp, or aril which envelopes the seed, has somewhat shriveled and become black. In this state the pulp has simply a sweet taste, but in the fresh state the pulp is whitish, or slightly tinged with pink, and has a refreshing acid taste. A sample of these fruits with the woody coat removed, showing the inner pulp preserved in fluid, from Siam, is shown in the Kew museum, and they suggest the possibility that this pulpy portion might be preserved in tins in a similar manner to pine-apples and sent to this country.” (John R. Jackson, Kew Gardens, London.)

The Litchi tree is evergreen, and the fruit seems to be highly esteemed by Europeans living in India and China; by some it is said to be “as

delicious, perhaps, as any fruit in existence." The pulp is transparent, in some varieties resembling the white of an egg. The Litchi was introduced to Florida last year by Mr. Wheatley, of Orange County.

Passiflora macrocarpa.—Native of Brazil and Peru. A commonly-cultivated "Granadilla" in Jamaica. Specimens of the fruit have been known to attain a weight of 8 pounds.

Passiflora maliformis (the Sweet-cup or Sweet calabash).—"It has a thick triangular stem, with leaves oblong, cordate, 6 inches long and 4 inches broad, and in the middle a lively green. The flowers are sweet-scented, large, of a pale red and blue; the fruit round, smooth, about 2 inches in diameter, of a dingy yellow color when ripe; the coat is hard and stringy, nearly a quarter of an inch in thickness, full of a very agreeable gelatinous pale yellow pulp, in which many oblong black seeds are lodged." (Loudon.)

The Sweet-cup is a native of the West Indies, and was introduced to Florida by Colonel Codrington, of De Land.

Platonia insignis.—"Known here as 'Bacury,' and is a very popular fruit. The tree is large, with broad dark-green foliage and large rose-colored blossoms. The fruit has a hard, smooth, bright-yellow shell; is as big as a very small cocoa-nut, and contains a few large seeds embedded in a semi-acid pulp of delicious flavor. The choicest and most expensive preserve in this part of Brazil is made from this fruit." (Edward S. Rand.)

Platonia species.—"Bacuri-miri" of Brazil.

Pachira aquatica (*Carolinea princeps*).—The "Provision tree" of British Honduras and other parts of Central America. The fruit of this tree is said to be round, about the size of a child's head, and containing numerous chestnut-like seeds, sometimes eaten by the natives during times of scarcity.

Phyllanthus emblica.—"Known as the Emblic Myrobalam. A tree of the dry forests of India and Burmah. The fruit is about the size of a small damson. The natives eat it raw, preserved, or made into sweetmeat, while it is used by Europeans for tarts and jellies. It is stated that a 'half-ripe fruit, if chewed, has the effect of making water taste sweet.'" (John R. Jackson.)

Phyllanthus emblica grows remarkably well in Florida; it is a beautiful tree, and not so tender but that in time it will be in common cultivation in south Florida.

Solanum pubescens.

Solanum Capense.

Spondias amara.

Spondias Cytheria (the Otaheite plum).—Commonly cultivated in the Sandwich Islands. Fruit a golden-yellow color, in size and shape somewhat resembling the Loquat, but said to surpass it in flavor. Flavor described as "aromatic, with a suggestion of strawberry and pineapple."

Vangueria edulis.—The “Voa-vanga” of Madagascar. Described as producing delicious berries three-fourths of an inch in diameter. Introduced to Florida by Mr. Bidwell, of Orlando. Grows exceedingly well, and sprouts from the root readily when frozen down.

TROPICAL ECONOMIC PLANTS NOT STRICTLY CLASSED AS FRUIT PLANTS.

The following are occasionally cultivated in extreme south Florida:

Coffea Arabica (the Arabian Coffee plant).—The Coffee plant was first fruited in the United States in the open air by Mrs. Julia Atzeroth, on the south side of the Manatee River, seven or eight years ago. Some time after, the Department of Agriculture at Washington being in want of fresh seeds, Mrs. Atzeroth sent them the first pound of coffee produced in the United States, for which she received \$10, not as a “premium,” as has been stated, but as the price of the seed.

At the time of the freeze of 1886 the original shrubs had attained a height of 10 or 12 feet, and were bearing profusely every year. They were killed to the ground, but sent up strong shoots from the roots in the spring, which were not injured last winter, and are now 3 or 4 feet in height.

Other plants were fruiting in various parts of south Florida, and many small plants had been set out, but unless of large size they were generally killed outright, except in the extreme southern part of the peninsula. It is probable that the culture of coffee could be made profitable on the extreme southern part of the main-land and on the lower range of keys, but unless artificial shelters are constructed the plant is too tender for extensive culture north of the Caloosahatchee.

The coffee shrub is evergreen, with dark-green glossy leaves, somewhat resembling those of the chestnut, though much smaller. The flowers are small and white, followed by red berries resembling cherries, each containing one rounded seed, or two seeds flattened on the sides facing each other. The pulp surrounding the seeds is valueless.

Coffee is said to be superior, and more freely produced, when grown under partial shade of some kind. Bananas or plantains are used for this purpose in many coffee-producing countries.

The principal enemies of the coffee plant are the “Coffee-leaf fungus” (*Hemileia vastatrix*) and the Cemiostoma fly. The destruction of the Coffee-leaf fungus is said to be effected by applying flour of sulphur when the dew is on and by dressing the ground with quick-lime.

The different brands of coffee, Java, Mocha, Rio, etc., are all produced from the same species, grown in different soils and climates, and effected somewhat by different modes of curing.

Coffea Liberica (the Liberian coffee).—This coffee grows to the size of a real tree, is a rich bearer, and produces larger berries than the Arabian coffee plant, but the fruit requires a longer time to ripen—about one year. It is said to be exempt from the attacks of the Cemiostoma fly, and to be less affected by the Coffee-leaf fungus. It is steadily

growing in favor in Guatemala, Jamaica, and other coffee-producing countries. But recently introduced into Florida. Its hardiness not yet tested, but it is likely to prove very tender as regards cold weather.

Coffea Bengalensis (Bengal coffee).—But recently introduced.

Cola acuminata (the Kola nut).—Introduced by Colonel Codrington, of De Land. Very tender, and not likely to succeed much above Charlotte Harbor. We quote Mr. Morris's description:

Locally the nuts are used as a stomachic and a tonic. They are said to have effected remarkable cures in dyspepsia and allied disorders, and are used for this purpose in the same manner as cacao or chocolate. It is prepared by grinding the dry cured nut into a powder, and mixing with boiling water, sugar, and milk. Some people use Kola nut regularly at breakfast in this manner, and consider it superior to everything else of the kind. To cure the nuts for export they only require to be taken out of the pods and subjected to careful drying in the sun until quite firm and hard. The process, however, is required to be thoroughly done, owing to the thickness of the cotyledons, and to prevent moldiness on the voyage.

Crescentia cujete (the Calabash tree).—The Calabash tree is native of tropical America as far up as Cuba, one species, *Crescentia cucurbitina*, being occasionally found on the extreme lower keys in a wild state. *Crescentia cujete* is the species commonly cultivated. The fruit hangs directly from the branches and trunk of the tree. The pulp is not edible, but the large shell is used for dippers, bowls, and drinking and culinary vessels of all kinds. The tree is very tender, but when grown from cuttings usually sprouts up from the roots if the tree is frosted back. The tree is rarely seen in Florida, but there are a few trees in Key West and in other parts of south Florida, and more might be grown anywhere in the lower part of the peninsula.

Piper nigrum (Black Pepper).—The black-pepper vine was introduced a number of years ago by Mr. Bidwell, but we do not know that any success in its cultivation has been yet reported. It is a native of the forests of Malabar and Travancore, in southern India. Full directions for its cultivation are given in Simmond's "Tropical Agriculture." It is possible that its culture might be made profitable on the lower keys.

Piper futokadsura (Japanese Black Pepper).—Has been introduced, but not much tested.

Theobroma cacao (the famous Chocolate tree).—Was introduced a few years ago, but is very rare in Florida. Might perhaps be cultivated in the extreme south, where coffee can be grown. A species of Erythrina is usually employed to shelter the young plants (called Madre de cacao), or in some localities the banana or plantain are used for that purpose.

Vanilla planifolia.—The orchid producing the true Vanilla bean of commerce was found a few years ago growing wild at Whitewater Bay, near Cape Sable, by Prof. A. H. Curtiss. It is quite probable that in this region its culture could be made profitable. It is grown from cuttings, which are planted at the foot of trees, on which the orchid climbs.

Vanilla aromatica is closely related.

SEMI-TROPICAL FRUITS.

ORANGE.

Citrus aurantium.

The orange is at present, of course, one of the most important, if not *the* most important, fruit of the lower South. It is cultivated for profit, with more or less success, along the Gulf and Atlantic coasts, from the Rio Grande to the sea islands of South Carolina. Louisiana and Florida are the only States that have raised more than enough for home consumption.

The great freeze of January, 1886, was perhaps the hardest shock to the orange industry ever experienced in the Gulf States, though it was undoubtedly a means of good in checking reckless extravagance and speculation so common in parts of the South, especially in Florida. The day is past when orange culture was regarded as only an easy and agreeable way to make an immense fortune, and Florida a modern El Dorado, where "golden apples" grew on every bush.

The bubble of past years has burst, the schemes of unprincipled land agents have been laid bare, the freeze has helped to restore people to their senses, and Florida stands to-day ready to compete with the great orange-growing countries of the world in the sharp struggle for a supremacy based on actual merit. The man who comes to Florida to-day with the idea of making himself a successful orange-grower must be, in the first place, a true pomologist, in love with his work and everything pertaining to it; and prepared to spend years of hard work, money, brains, and the concentrated efforts of a life-time, in order to attain his end. There are probably hundreds more to come yet with the old idea that a few acres of land—trees to set on it—an interval of three or four years—a fortune. That thousands have already come to Florida with this illusion in mind and been disappointed is owing to the extravagant "yarns" of unprincipled land agents and owners—a class of people despised by the true friend of Florida as of much more harm than good.

Orange culture should be placed on a level with any honest legitimate business, fitted for those who love horticultural pursuits. The man whose decided preference would be to carry on a stock farm in the West or a grocery store in New York, but who tries orange-growing as an easy way to a fortune, will be disappointed. One must understand and like the soil, climate, and business; and not be afraid of hard work, "hard-pan," or "hard-tack"; discouragements by insects, freezes, "dropped" and "split" oranges, "rust," poverty of the soil, and the wiles of commission merchants, to be successful.

By the freeze of 1886 the orange trees of every part of the South except those below middle Florida (the lake region of Sumter, Orange,

and Lake counties), suffered severely. In Louisiana they were in most cases killed to the ground, and no crop of any amount can be expected for several years. This was also the case in parts of southern Texas, Mississippi, and Alabama, in extreme north Florida, and along the coast of Georgia and South Carolina, where a few trees were occasionally grown.

In the neighborhood of Palatka, Putnam County, Fla., the old trees lost their leaves and 2 or 3 feet of wood on the ends of the branches, and yet many groves bore full crops last season, though that was the exception rather than the rule. In Orange, Lake, Sumter, and Hernando counties many of the trees lost their leaves, but were little damaged otherwise. Below Tampa no serious damage was done, though it was thought by some that the shock of the freeze was influential in preventing a good summer's growth on the trees. There is no doubt but that had the weather after the freeze suddenly turned warm and sunny, the damage would have been immensely worse, perhaps resulting in the loss of most of the bearing trees in the State; but the cold cloudy weather following was especially favorable, giving everything a chance to "thaw out" gradually.

Last winter (1886-'87), though unusually severe, did not result in any serious damage to bearing trees in this State.

The crop of oranges last year for the Gulf States, except a very little in Louisiana, was confined to Florida. It, too, was unusually light, and high hopes were raised that unusually high prices would be realized. In some cases these resulted in partial or complete disappointment, owing to the glaring defects in the system of marketing, the crowding of the great markets to the almost entire exclusion of the smaller ones during the month of December, the excessively high rates charged by railroads and other transportation companies, and other causes, perhaps the most obvious of which is the shipment of such immense quantities of inferior fruit. The aim of Florida orange-growers should be to grow and market no oranges except the very best, highest flavored, and most attractive fruit, put up in the neatest possible manner. (In connection with this subject a most valuable address was delivered before the Farmers' Institute at De Funick, March 8, 1887, by Mr. A. H. Manville, which appeared afterwards in the columns of the Florida Dispatch for March 14, 1887.)

The crop marketed from Florida during last season (1886-'87) reached the amount of over 1,000,000 boxes.

Perhaps a fair idea will be given of the prices realized by giving the figures relative to the crop of Col. C. H. Foster's "Fair Oaks" grove, at Manatee, which may be taken as a fair sample of a seedling grove on hammock land. This grove is situated on first-class hammock land; the entire grove consists of 4,000 trees, but only 1,500 of these are bearing, excepting now and then one of the younger trees. Of these 1,500 trees, 700 have been set out in grove form sixteen years, 400 have been out eleven years, and 400 only seven to ten years. From these trees

were shipped last year 4,724 boxes, which sold (with freight deducted) for \$7,168.96. This gives an average of about \$1.50 per box. When it is known that four car-loads of these were literally thrown away during the "glut," it will be seen that the average for the balance is good. The trees are all of the best quality of seedlings.

Deducting the entire expenses during the year, for care of grove, fertilizers, hired help for picking, sorting, packing, plowing, pruning, horse-feed, overseer's salary, taxes, and all incidental expenses, leaves a balance of \$3,463.95 net proceeds for one year.

Two years ago, from 200 trees in this same grove, which had then been set out but five years, 80,000 oranges were picked. There is but little doubt that a budded grove of the best varieties, of the same size and age as this, on the same kind of land, but more highly fertilized (Colonel Foster's grove has been fertilized but very little), could be made to bring in twice this amount of money in the same season.

The crop of oranges this year, it is estimated, will be much lighter than that of last year, considering the increased number of trees that have come into bearing. The spring bloom was very light all over the State. Hopes were then entertained of a crop of June blossoms, but these hopes, in many parts of the State, were not realized, probably on account of our unusual seasons.

It is probable that had we had our customary drought in April and May, at the beginning of the rainy season, in June, most of the orange trees would have blossomed freely; but instead of our usual weather there was a severe drought in February and March, which probably had its effect in causing the trees to bloom but little then; then from the first of April copious rains fell until they were merged into the usual showers of the "rainy season," and there was no check in the growth of the trees such as usually occurs in May, to be renewed again by the copious showers of June.

Still there was a moderate crop of June and July blossoms in the lake region from Leesburgh to Orlando, and occasionally in other localities. Near Orlando there is considerable of a June crop, especially on the budded trees, which in all cases have held their fruit better than the seedlings. It is estimated that there will be two-thirds of a crop in this region.

At Manatee, which last year shipped 13,083 boxes and 301 barrels of oranges, there will not be one-fourth of a crop. It is estimated that there will not be over 1,000 boxes on the Foster grove, which last year produced 4,724 boxes, besides uncounted numbers of "drops."

Taken altogether, those familiar with the crop prospects all over the State tell us that not over 1,000,000 boxes may be expected from Florida this year, while a full crop for this year would have been over 3,000,000 boxes.

The acreage in orange trees is increasing very fast. It is impossible to estimate the number of trees set out each year, or to make any satis-

factory guess at it. But comparatively a small amount of the choicest hammock lands remain yet uncleared, though there are many thousands of acres of high pine land suited to the orange and lemon yet in a state of nature all over south Florida. There are several groves in the State of one or two hundred (or more) acres in extent. Among the largest of the older groves are the Bishop and the Harris groves, at Citra; older and more famous, though smaller groves, are those of Colonel Hart, opposite Palatka; of Colonel Magruder, at Rockledge, Indian River; and the Spear grove, near Titusville.

The Stebbins grove, at Orlando, is a fine young grove of 160 acres just coming into bearing. Parties in Hernando County, it is said, are planting out a 1,000-acre grove.

The best example in the State of an orange grove on low hammock land is the fine grove of Mr. E. H. Hart, at Federal Point. This grove is of the choicest budded varieties; the land is "bedded up" by means of numerous ditches. The large grove of General Sanford, at "Belair," near Sanford, consists of 125 acres; it is planted on high pine land. General Sanford has been the means of introducing into the State many of the choicest varieties of the orange and lemon from the Mediterranean region.

About the first nursery of orange trees in the State was planted out by Mr. S. B. Parsons, the well-known horticulturist of Flushing, Long Island, on the Saint John's River, in 1869. Among the pioneer nursery-men who lived in the State the names of Lucius Hardee, Albert I. Bidwell, and A. J. Beach are conspicuous. There are now forty or fifty first-class nurseries in the State.

The prices of budded orange and lemon trees in the State are about as follows:

	Per 100.
Diameter of stock— $\frac{3}{8}$ to $\frac{7}{8}$ inches, one-year buds	\$40
$\frac{7}{8}$ to $1\frac{1}{8}$ inches, one-year buds	50
$1\frac{1}{8}$ to $1\frac{1}{2}$ inches, one-year buds	60
$1\frac{1}{2}$ to $1\frac{3}{4}$ inches, one-year buds	75

About 10 per cent. is deducted when 1,000 or more trees are sold, and trees of the *Citrus nobilis* varieties are held at somewhat higher prices.

The insect enemies of the orange tree are very numerous; their number is said to be something over fifty. The most important of these, at least the one that has caused the most damage, is the common scale-insect. Many effective remedies are given for the scale, but none will be needed if the trees are kept in a good healthy condition. The rusty oranges (called "Russetts" in northern markets) are said to be so disfigured by the rust-mite, a microscopical insect.

The insect enemies and friends of the orange have been enumerated and described in a valuable work on orange insects by William H. Ashmead, also in a work by Dr. C. J. Kenworthy (these may be had of the Jacksonville news-dealers); they are also most exhaustively described in the excellent reports of Prof. C. V. Riley and Prof. J. H.

Comstock, which have appeared in the reports of the United States Department of Agriculture since 1878.

These, together with practical treatment for their destruction, as well as the enumeration, causes, and cures of the various diseases of the orange tree are fully discussed in the following works on orange culture by some of the best and most practical writers in the State:

Orange Culture, by A. H. Manville; Handbook on Orange Culture, by T. W. Moore; Treatise on the Culture of the Orange, by George W. Davis, M. D.; Florida Fruits and How to Raise Them, by Helen Harcourt. Any of these may be purchased of the Jacksonville news dealers.

Much valuable information on orange culture can also be found in the columns of the three leading agricultural papers in the State—the Florida Dispatch, edited by A. H. Manville, Jacksonville, Fla.; the Florida Farmer and Fruit-Grower, edited by Prof. A. H. Curtiss, Jacksonville, Fla.; and the Florida Agriculturalist, edited by E. O. Painter, De Land, Fla. The last-mentioned paper published a few years ago a complete translation of Gallesio's celebrated work on orange culture.

VARIETIES.

The following list of varieties now growing in the State we have endeavored to make as complete as possible up to date, but as new oranges are constantly being introduced, both by importation and the production of new native varieties, it is difficult to catalogue them completely. We are indebted to some of the above-mentioned works on orange-culture, and to the leading nursery catalogues of the State, for most of the descriptions. We have endeavored to give synonyms when possible to determine that such varieties are really synonymous, but in cases where there is dispute as to identity, as in the Navel class, each variety is given separately. Many have not been introduced into Florida long enough to determine their value or their identity.

I.—CITRUS AURANTIUM DULCIS.

Acis.—"A very thrifty strong-growing tree of wide-spreading form; fruit late in ripening, large size and of good quality." (Aaron Warr.)

"Large, roundish, ovate. Quality good. Tree strong growing. Imported." (Manville.)

Acapulco.—"Recently from California. Said to be large and fine." (Manville.)

Africana.

Arcadia.—"Size large; form somewhat flattened; color deep; eyes set in slight depression; stalk inserted in a slight roughened cavity; skin smooth with marked pits; thickness of skin $\frac{3}{16}$ inch; longitudinal diameter, $2\frac{3}{4}$ inches; transverse diameter, $3\frac{1}{4}$ inches; color of flesh, deep; grain coarse; pulp melting; juice slightly subacid; quality good. Supposed seedling raised at Arcadia, and introduced by the Rev. William Watkin Hicks." (Moore.)

Beach's No. 1 (syn. *Egg*).—"The earliest grown, medium size; very sweet; rich high flavor; ripens from September 15th to October 1st. Shape, nearly round; fine shipping qualities; color very dark orange." (A. J. Beach.)

"A subvariety of early oblong, which it resembles, excepting that the fruit is smaller, having a smoother skin and being more juicy." (Manville.)

Beach's No. 2.—"Above medium size, inclined to pear-shape; qualities for eating will compare with No. 1; ripens November 1. Color, dark orange; fine tough rind for shipping." (A. J. Beach.)

Beach's No. 3.—"Has a peculiar and tender pulp, very rich, slightly acid when ripe; is a great favorite with many; size about medium; shape flat from stem to blossom end; color light orange; ripens December 1st; will bear shipping finely." (A. J. Beach.)

"Size above medium; form oblong; color light; eye set in flattened surface; stem inserted in a slight wrinkled cavity; thickness of skin $\frac{3}{16}$ inch; longitudinal diameter, $3\frac{3}{8}$; transverse, $3\frac{1}{4}$ inches; pulp coarse, not melting; juice subacid; quality fair." (Moore.)

Beach's No. 4 (synonyms, *Buena Vista*, *Old Vini*).—"Is one of the best late ripening; large in size, often weighing 1 pound; shape round; subacid when ripe; a beautiful leathery rind; will keep longer than any apple in the country." (A. J. Beach.)

"Size about medium; slightly flattened; color, dark orange; eye broad and set in a slight cavity; stem inserted in a narrow wrinkled depression; surface of skin rough; thickness of skin $\frac{3}{16}$ inch; longitudinal diameter, $2\frac{3}{4}$ inches; transverse, $3\frac{1}{8}$ inches; grain coarse; pulp melting; juice subacid, and remarkable for a slightly vinous property; quality good. Seedling raised by Colonel Dancy, Buena Vista, Saint John's County, Fla. (Moore.)

Beach's No. 5.—"Large, pear-shaped, very sweet, and of good flavor; color dark orange; ripens in February; very prolific; makes a full crop every year; will carry the fruit perfect through blooming season." (A. J. Beach.)

Bell.—"Large, pear or bell shaped; skin firm; juicy. Tree prolific, a strong grower, having fewer thorns than some varieties. Probably imported, but long grown in Florida. (Manville.)

Botelha.—"Imported; said to be superior, with thin rind and rich pulp. Apparently differs little from native varieties." (Manville.)

Brazilian.—"Large; round or oblong; of fine quality; an immense grower and bearer. Imported." (G. H. Norton.)

Canton hybrid.—A newly-imported Japanese orange.

Catania.

Centennial.—"This variety, introduced by E. H. Hart, has not been thoroughly tested, but it promises well. It was awarded first premium at the State fair in 1885. It ripens early and hangs on the tree late, and as the quality is fine, it may prove to be one of our very best varieties." (A. L. Duncan.)

*Chilensis dulcis.**Circassian.*

Charley Brown.—"Native variety; strong grower; fruit much flattened at ends; good quality." (Kedney.)

China Sweet.—"Comparatively new. The fruit of medium size, rind thin, tender, juicy, sweet, and delicious. This has taken the first prize at the State fair for three years." (A. L. Duncan.)

Chuchupilas.

Cunningham.—Originated in Sumter County, Fla. Scored 99 points at New Orleans Exposition.

Creole.—"Large, round, firm skin, juicy. Quality good, tree prolific, vigorous, somewhat thorny." (Manville.)

*Dancy's Best.**De Bary's Best.*

Dixon.—"Fine large orange, first-class, good shipper. Native seedling." (Manville.)

Dr. May's Best.

Double Imperial.—Discovered in Louisiana by Maj. A. W. Rountree, of New Orleans, and buds were sent by him to Florida. It has the peculiar "navel" mark, and is of excellent quality. (Van Deman.)

Dulcis Sanguinea de Colmar (Sweet Blood of Colmar).—Recently introduced. "Rather small, but of good quality. The flesh shows but little red." (Van Deman.)

Dulcis Vanilla.

Dummitt.—"Large, bright, juicy, sweet, sugary; a first-class orange, except the skin is thin and tender, which renders it difficult to ship." (Manville.)

Dulcissima (syn. *Dulcis*).—"Small, very sweet, generally seedless; prolific. Well known in Paris." (Manville.)

Du Roi.—"Size medium, round; skin firm; juicy. Quality best. Plainly marked, being ribbed like a musk-melon. A good shipper. Tree very prolific, vigorous; few thorns. We have fruited this variety for a number of years, and can recommend it as unequaled in quality; its distinctive mark adds greatly to its value as a market fruit." (Manville.)

Early Spanish.—Early. "Fruit rich and well-flavored, a good shipper, strong grower, and ripens its fruit in October." (Kedney.)

Early Oblong (syn. *Thornless Bell*).—"Fruit medium size; oblong; skin thick; lacking the subacid of other sorts. Quality fair. Although its color turns little if any earlier than other sorts, its juices attain perfection in September and October, when it should be artificially ripened and marketed. Tree bears young; prolific; vigorous; not as large as some; leaves elliptical, acute, and scattering; branches slender and thornless. It is easily distinguished by the appearance of fruit and foliage. This is far from being all that could be desired as an early fruit, but is the only early sort that has thus far been brought to public notice." (Manville.)

Enterprise Seedless.—Good early variety, almost thornless.

Emperor of China.

Egg Nutmeg.

Everbearing (Pelton's).—Described as a first-class orange, producing several crops in a season.

Excelsior.—"Medium-sized, round, sweet, delicious, slight pine-apple flavor; quality good. Tree vigorous, few thorns, imported." (Manville.)

Exquisite.—Size below medium, fruit thin-rinded, rich and juicy. A good grower. Imported by General Sanford.

Floral (Mann's).—A thin-skinned juicy fruit of small size, high flavor, and remarkable sweetness; tree said to be of vigorous habit and nearly thornless; fruit said to mature very early in the season, being quite palatable in October. Originated in the grove of Senator A. S. Mann, of Floral City. Named at the Orlando exposition, in February, 1887, by the committee on citrus fruits.

Foster.—One of the best early oranges in the State. Can be eaten in August, is good in September, and in October, November, and December is unsurpassed by any orange unless it be the Washington Navel. Original tree, from Havana seed, planted over forty years ago, now in the grove of Col. C. H. Foster, of Manatee. Orange perfect in size (according to the scale of the citrus committee at Orlando, which adopted $2\frac{3}{4}$ inches as the standard of perfection, 176 to the box, unsurpassed in smoothness and brightness of skin and in flavor.*

Gates.—Another superior sort, resembling the Foster, ripening early. Originally from Havana seed.

Hart's Late† (syn. *Hart's Tardive*).—Probably identical with the "Brown" orange. Imported from Thomas Rivers, by S. B. Parsons, Flushing, L. I., who gave it to E. H. Hart.

"Medium-sized, round; skin smooth and thin; grain fine, with a brisk and racy flavor. Does not mature until late in the spring and retains its juices until the middle of July, or even later, and is especially valuable on this account; quality good. Tree prolific, a strong grower; branches thornless or nearly so; foliage somewhat distinct. This is the only late sort which has been thoroughly tested in this State. We have fruited it for some years, and can highly recommend it. It can be marketed from March to July, when oranges command high prices, and is a valuable acquisition for locations and latitudes where the fruit is not liable to be frozen on the trees in winter." (Manville.)

Heong Leong.

Halifax River Seedling (Anderson's).—A fine native sort, originated at Ormond, Volusia County.

*Specimens examined here at the Department of Agriculture this fall were of excellent quality. (H. E. VAN DEMAN.)

†Specimens from Mr. Hart received fresh from the trees this year on June 13, were only just ripe and in prime condition. The quality was excellent. (H. E. VAN DEMAN.)

Higgins.—"Medium, fair; skin smooth and thin; pulp fine, juicy, sweet, and excellent. Native seedling." (Manville.)

Havana Sweet.

Homosassa.—"Size about medium, somewhat flattened; very heavy; color bright; skin remarkable for its toughness and density, and thinner than that of any variety thus far examined; eye dark, varying from one-eighth to two-eighths of an inch in diameter, and set in a flattened surface about three-quarters of an inch in diameter; pulp very fine, and remarkably juicy and sweet; flavor full, vinous, and sprightly; membrane covering segments of pulp very thin and small in quantity. Homosassa took the first prize for the best single orange at the State fair in 1877." (Report of Pomological Committee of Fla. F. G. A.)

This orange originated in the grove of Hon. Mr. Yulee, at Homosassa, Fla.

Higley's Late.

Indian River.—Superior native seedling; very thorny.

Italian.—"Medium large; skin thin; pulp rich; very prolific, and nearly thornless." (Wheatley.)

Imperial.—Originated on Indian River, in the grove of Mr. C. B. Magruder.

Jaffa.—One of General Sanford's importations from the eastern Mediterranean. The fruit was one of the four varieties that scored over ninety points at the Orlando exhibition in February, 1887. Tree nearly thornless, a strong grower, and with beautiful and distinct foliage.

Konah.—Recently from the Sandwich Islands via California.

King of the Halifax.—Native seedling of good quality.

Kowla.—From the Himalayan region of India.

Large Chinese.

Lee.

Loretto.

Leve.

Long.—New variety, not yet tested.

Magnum Bonum.—"Size, large to very large; flattened; color, light clear orange; eye set in a slight cavity; stem inserted in a narrow depression; skin very smooth and glossy; thickness of skin $\frac{1}{8}$ inch; longitudinal diameter, 3 inches; transverse, $3\frac{3}{8}$; color of flesh, light; grain very fine, tender, and melting; fruit very heavy and juicy; sweet, rich, and vinous." (Pom. Com. of Fla. F. G. A.)

"Magnum Bonum was awarded the Bidwell prize of \$50 at the State fair of 1878 for the best peck of oranges, in competition with over forty varieties; also, the first prize awarded to the best peck at the State fair of 1877." (Bidwell.)

Maltese Blood.—"Medium size; round or slightly oblong; very juicy, sweet, and of sprightly flavor; pulp marbled with red. This red mark

* Size, medium; shape, nearly round; color, rather pale; skin, smooth; pulp, rather free from core, and quality good but not extra. See my annual report for 1887. (H. E. VAN DEMAN.)

shows but little in fruit from young trees, but on old trees the pulp becomes quite red late in the season. Quality, best. Tree, strong bushy grower; thornless; foliage distinct; good bearer. Imported." (G. H. Norton.)

"Size medium, round; flesh streaked with red, increasing till late in the season, when the whole pulp is colored; quality, good; flavor, excellent. Tree a good grower, an early bearer, and entirely thornless. This orange always commands the highest market price." (A. L. Duncan.)

Maltese Oval.—"From the Mediterranean. Imported by General Sanford. Thornless, rapid grower, very prolific; fruit oval in shape and of a beautiful orange color, medium in size, and bears transportation unusually well. Of some twenty boxes we shipped to England last winter, there were only ten oranges spoiled on arrival in the lot. This variety is a particular favorite in the London market. It is probably more largely planted here in Orange County than any other kind." (Kedney.)

Majorca.—"Size, medium; round, rich, juicy, and sweet; a good keeper and shipper; quality best. Tree a strong bushy grower, very robust; foliage distinct; nearly thornless; fine bearer; imported from the island of Majorca by General H. S. Sanford." (Norton.)

"The Majorca has a more handsome and thinner rind, more attractive in shape, not seedy, but more so than the Jaffa, but its flavor and acid in a hot spring day are unsurpassed to quench thirst." (Phelps.)

Marquis.—Recently imported from Malta by Colonel Church, of Orlando.

Madame's Sweet.—Native seedling, from Colonel Magruder's grove at Rockledge, Indian River.

Madame's Vinous.—Another from the same source. "Colonel Magruder's Madame's Vinous, as will be seen by reference to the table, scored, with the exception of the Washington Navel, the highest of any orange examined by the committee, reaching ninety-two and one half out of one hundred points; it was declared by the committee, several of whom were experts in orange testing and nomenclature, to be the finest orange they had ever tasted, being out-ranked by the Navel only, because it had seed and pulp, while the latter had no seed; in flavor and sweetness it out-ranked the Navel." (A. H. Manville; report of S. Fla. Ex. in Dispatch for February 28, 1887.)

Mangosteen.—Native seedling, originating in Sumter County.

Malta St. Michael.

Markham's Best.

Markham's Premium.

Macrocarpa.

Melitensis.—Introduced from Paris, France, by the Department of Agriculture at Washington. A good grower.

* This variety now gives evidence which leads me to think it may prove to be identical with Washington Navel. (H. E. VAN DEMAN.)

Melitensis Sulcata.

Mediterranean Sweet.—"Medium size, seedless; skin smooth, pulp melting; quality good. Tree thornless, prolific, and bears second year from the bud; foliage distinct. Habit reclinate. Moderate grower; with us has fruited the earliest and heaviest of all." (A. H. Manville).

First imported by Mr. A. J. Bidwell.

Mediterranean Sweet (Garey's).—A variety first imported from Thomas Rivers, of England, by Messrs. Ellwanger & Barry, Rochester, N. Y., and by them propagated (under names on the original labels), and one of the trees sent to Mr. Thomas A. Garey, Los Angeles, Cal., labeled "Shaddock," in the year 1870. After fruiting, the variety was sent to Mr. Bidwell, at Jacksonville, Fla., for the true name, and by him pronounced to be the Mediterranean Sweet, of which variety he already had trees at that time in his nursery. It is said, however, to have proved to be a slightly different variety, "closely resembling the Mediterranean Sweet, but the fruit of superior quality, and a very late ripener."*

Mediterranean Sweet (Sanford's).—Distinct variety, imported by General Sanford. Is described as follows: "Size medium to large; round or slightly flattened; skin firm and of even thickness; juicy, sweet, and rich; one of the most valuable. Tree a good grower, with few thorns; early and profuse bearer." The true name of this variety is said to have been lost.

*Mediterranean Blood.**Moore's.*

Navel (Australian; synonyms, *Umbilical*, *Pernambuco*, *Seedless*, *Embiguo*).—"Size large to very large; eye presenting an umbilical appearance, from which it obtains its name; stem inserted in a shallow ribbed cavity, with deep lines; skin, three-sixteenths thick; longitudinal diameter, $3\frac{5}{8}$; transverse, $3\frac{3}{4}$; flesh very fine, melting and tender; juice sweet, sprightly, vinous, and aromatic; quality, first." (Moore.)

Originally from Bahia, Brazil, by way of Australia and California. Tree shy bearer.

Navel (Parsons's).—Introduced into Florida in 1869 by Mr. S. B. Parsons, of Flushing, Long Island, who imported it from Mr. Thomas Rivers, of England. Very juicy, but a shy bearer.

Navel (Platt's).—Evidently distinct.

Navel (Atwood's Seedless).—Probably identical with Washington Navel, as it has been traced to trees received from Washington, D. C. under the name Bahia. (Van Deman.)

Navel (Ormond's Prize).—Thought to have originated from the same source.

Navel (Sanford's).—"A fine flavored fruit, often with pink-tinted pulp, and marked on the apex with a small protuberance." (E. H. Hart.)

* To me this orange seems identical with Maltese Oval. (H. E. VAN DEMAN.)

Navel (Sanford's, from Belgium).—An extraordinarily prolific bearer.

Navel (Whitner's).—"From a tree sent from the Department of Agriculture, in 1873, to Colonel Whitner, of Orange County." Very seedy; distinct.

Navel (*Washington*; synonyms, *Bahia*, *Riverside Navel*).^{*} The trees of this remarkable variety were first imported by Mr. Saunders, of the United States Department of Agriculture, from Bahia, Brazil, in 1870. They were twelve in number, supposed to be all alike, having been propagated and grown in Brazil especially for the Department and under the direction of the Commissioner of Agriculture. They were named by Mr. Saunders "*Bahia*," in honor of the place from which they came. Two trees propagated from these were sent to Mrs. L. C. Tibbetts, of Riverside, Cal., in 1873. When these trees fruited and their superior quality was ascertained they were called by the orange-growers of California the "*Washington*" or "*Riverside*" Navel, to distinguish the variety from the Australian Navel, then commonly grown. The fact is also established that the true Washington Navel was also sent to Orange County, Fla., about the same time. In 1882, Mr. A. J. Bidwell procured buds of this variety from Mr. A. D. Haight, a near neighbor of Mrs. Tibbetts. Trees from both these sources have been bearing in Florida for a number of years, clearly proving it a distinct variety, and far superior to the old Parsons Navel. The orange is practically seedless and unsurpassed in quality.

Navel (Blood).—A supposed cross between the Washington Navel and Maltese Blood, produced by Mr. E. H. Hart.

Navel ("Blind").

(The foregoing list of the varieties of the Navel orange, their origin, manner of introduction, etc., has been carefully and laboriously gleaned in a great measure from the multitude of facts evolved by the discussion of the varieties of the Navel orange during the past summer in the columns of the Florida Dispatch, and partly determined from personal observation. There is but little doubt that most of the oranges named constitute distinct varieties, many of them of great excellence, although some still hold to the opinion that these differences are in a great measure caused by peculiarities of soil, climate, and treatment.)

Nicaragua.—Imported by way of California.

Nonpareil.—"Size, above medium, somewhat flattened; color ordinary; eye broad and set in a slightly-depressed cavity; stalk inserted in a level scarred surface; skin three-sixteenths of an inch thick; lon-

^{*}After examining specimens of fruit from many places in Florida and California under all of these synonyms and those grown on the original trees here, and having read what has been published in the papers on the subject, I see no reason for believing that all of the twelve trees imported from Brazil are not all of one variety. Judging from what I have seen of the behavior of this tree in bearing and the testimony of many persons of large experience with it, there is no escaping the conclusion that the Washington Navel is a poor bearer, except perhaps in certain sections of California and Florida. (H. E. VAN DEMAN.)

gitudinal diameter $3\frac{1}{4}$ inches; color of flesh ordinary; grain fine; pulp melting and tender; juice subacid and vinous. Nonpareil took the first prize at the State fair of 1878 for the best peck and best ten oranges." (Rept. of Pom. Com. of Fla., F. G. A.)

Nutmeg (Enterprise Sport.)—Very strongly marked, but otherwise comparatively worthless.

*Onoro No. 1.**—Originated in the grove of Rev. Lyman Phelps. "It is a seedling from a Maltese Blood; it is the best orange from the first bearing I ever saw. My neighbor, Colonel Whitner, says it is the best orange he has eaten the past season." (Phelps.)

Onoro No. 2.—From the same source. "This is also from a Blood orange, the seed of which was planted on a certain wedding-day. The small tree was brought here and has been fruiting nine years. It is sweet, earlier than any orange I have, save the insipid Sweet Seville." (Phelps.)

Osceola.—"Size large, slightly flattened; color bright; skin smooth and glossy; eye very small and set in a slight cavity; stem inserted in a small, shallow, wrinkled depression; thickness of skin three-sixteenths of an inch; longitudinal diameter 3 inches, transverse $3\frac{1}{4}$ inches; grain coarse; pulp rather melting; juice sweet, quality good; seedling, raised by L. H. Van Pelt, Mandarin, Fla." (Moore, from Rep. of Fla. F. G. A.)

Orange Lake.—Native seedling, of good quality.

Parson Brown.—"Size medium, oblong; skin smooth; fine flavor; a fine shipper, and by some considered the best of the early oranges. It begins to ripen in October." (A. L. Duncan.)

Paramatta.

Peerless (syn. *Rember's Best*).—"Large round; color, light clear orange; skin smooth, firm and thin; juicy, subacid; flavor delicious; quality best. Tree prolific and vigorous." (Manville.)

Originated on Drayton Island, St. John's River.

Pine apple.†—"A new variety of Magnum Bonum, Homosassa and Nonpareil type, recently brought to public notice. Originated in the grove of Hon. P. P. Bishop, in Union County. Said to be very fine." (Manville.)

Pierce's Blood.—"One of the handsomest oranges grown; fruit colors early; very good early in the season, and improves in quality until March or April; can be shipped any time from November to April; fruit medium size; skin thin and leathery; pulp mottled, blood red late in the season; flavor superior. Fine grower and nearly thornless." (F. S. Cone.)

Pierce's Champion Prolific.—A Florida seedling, introduced by Mr. R. W. Pierce, of Indian Springs, Fla., who describes it as follows: "One of

*The specimens sent to this division by Mr. Phelps, of Sanford, Fla., last spring, were of most excellent quality, being sweet and yet of very sprightly aromatic flavor. (H. E. VAN DEMAN.)

†Medium size, round or slightly flattened; skin smooth, thin, and of a dark orange color; flavor very pleasing; said to be a poor bearer. (H. E. VAN DEMAN.)

the very best Florida oranges grown; so pronounced by every one who has tested it. Fruits young, often at two years from budding. Bears heavy and regular crops. Medium size; ripens early, and keeps well on the trees till late in the season; ships well; skin thin and leathery; fruit very tender; juice rich, and with spicy flavor; few seeds. Tree rapid grower; few thorns on old wood."

Phares.—Originated in Sumter County.

Poor Man's orange.

Poncina Musatania.

Portugal.—Imported via California.

Pride of Malta.—Imported six years ago by Mr. J. A. Bostrom, of Ormond, Fla. Fruit medium size, flattened; skin somewhat rough; juice very sweet; attaining perfection in November. Tree a vigorous grower and of fine form; branches nearly thornless.

Prata (syn. Silver Orange).—"Rind pale yellow and thin; flesh pale, flavor piquant and delicious." (Manville.) Imported.

Prolific.

Queen.—Recently imported. Thorny.

Queen of the Halifax.—Native seedling, from Ormond, Fla.

Robert's Acme.

Rio.—Imported. Not thoroughly tested.

Ruby.—"A new orange, of superior quality, recently imported. Tree of strong, vigorous growth; nearly thornless. Fruit rather below medium in size; nearly round; skin very thin and smooth; pulp in March and April ruby-red." (F. S. Cone.)

Saint Jago.

Sabrina.

Sandwich Island.

Saint Michael's.—"Medium size, round, thin skinned, nearly seedless, and juicy; quality good. Tree bears young; prolific; few thorns; foliage distinct." (Manville.) Originally imported from the island of that name.

Saint Michael's, Large.

Saint Michael's, Small.

Saint Michael's Paper-Rind. *—From California, where it is highly recommended. Said to be thinner-skinned variety of the Saint Michael. Described as a "small, but first-class orange, of very fine flavor. The tree is somewhat thorny, a good grower, and very prolific bearer." Has fruited in Florida.

*Having seen a great many specimens of this variety from California, and all very small, slightly oblong, very smooth and thin skinned, and very pale colored, I think it quite distinct from Saint Michael. It is there claimed to be the result of bud variation, and possibly this may be true. But the contrast is very marked in all respects except shape and flavor.

Specimens from J. E. Cutter, of Riverside, Cal., gathered from the same tree and the same bud, were true types of the two varieties, and in all the above respects widely dissimilar. (H. E. VAN DEMAN.)

Saint Michael's Blood.—Imported by General Sanford.

Saint Michael's Egg.—"Large, oval; thick-skinned; juicy, but not rich; quality fair. Tree prolific; few thorns." (Manville.)

Seletto.

Selecta.—"Almost thornless, strong grower, imported recently from Brazil; early and prolific bearer; more generally free from rust than any kind we know; orange flattened in shape; extra good shipper; and the finest-flavored variety that we know." (Kedney.)

Sicily.

Sirinaggar Cindra.—From the Himalayan region of India.

Star (Drake's).—"Fruit large and very handsome; slightly flattened, and distinctly marked with stripes (rather longitudinal ribs); of the best quality. Tree a rampant grower; form an umbrella-shape; entirely thornless after six or seven years old; foliage of light color, the leaves being peculiarly crimped. A very distinct variety, and undoubtedly imported. There are several large trees of this variety budded on sour stocks in the grove of Mrs. C. B. Drake, of Drake's Point, Fla., but its origin is unknown." (Norton.)

Star-Calyx.—"A new variety, of peculiar-looking foliage, rather crimped, limbs drooping in habit, early and prolific bearer; fruit small in size, of very sweet and rich flavor." (Kedney.)

Starke's Best, *Starke's Favorite*, and *Starke's Seedless*.—Among the most excellent of native sorts.

Spratt's Harmon.—"Native seedling; excellent every way; said to be very prolific." (Manville.)

Spicer's Seedless.—Has few seeds; quality fair.

Sustain.—Introduced by S. B. Parsons, from Thomas Rivers, of England. It is a very poor bearer, but the fruit is of good quality. Rather small.

Sweet Blood (John Saul's).

Sweet Blood (Sanford's).

Sweet Seville, *Hick's* (synonyms *Sugar Sweet*, *Golden Angel*, *Picnic Orange*).—"Size small, slightly flattened; color comparatively deep; eye small, without depression; skin very smooth; thickness $\frac{1}{8}$ of an inch; longitudinal diameter 2 inches; transverse $2\frac{3}{8}$ inches; color darker than Washington Navel orange; foliage differs from other varieties examined; leaves markedly obovate; average length about $3\frac{1}{4}$ inches, width about $2\frac{5}{8}$ inches; grain very fine, juicy and melting; juice very sweet and sprightly; quality best; a superior fruit in every respect except size. Supposed to be a seedling, raised at Arcadia, Saint John's County, Fla." (Com of Fla. F. G. A.)

Sweet Seville (Tolman's).—"Size below medium, but larger than Hick's variety; form flattened; color light orange; eye large, without any cavity, and surrounded by a dark circle; stem inserted without cavity; skin smooth and $\frac{2}{16}$ of an inch thick; longitudinal diameter $2\frac{1}{4}$ inches,

transverse 2½; pulp fine, melting, juicy, sweet; inferior quality to Hick's variety. Origin, Mandarin, Fla." (Com. of Fla. F. G. A.)

Tahiti.—"Large size, round; pale yellow; skin very thin; grain fine; pulp tender and melting; juice subacid; quality good. Tree vigorous, prolific, and very thorny. Imported." (Manville.)

Teneriffe.

Tucker's Seedling.—A native variety, from Sumter County, Fla.

Tuberose.

Variegated (Beach's).—Foliage and fruit beautifully variegated with creamy white and green. A sport from Beach's No. 5. A strong grower and first-class fruit.

Valencia August (syn. *Valencia Late*).—Sometimes known in California as Rivers's Late. Introduced to California by Mr. Chapman, from Rivers's nursery, England, marked as Navel, but when it came into bearing was recognized as the orange known as Valencia August in Spain. It was introduced recently to Florida from California, and also, several years ago from the Mediterranean, by Colonel Church, of Orlando.

Tree said to be a good grower, somewhat resembling the Washington Navel in habit of growth. Fruit said to resemble Mediterranean Sweet, except in color, being lighter colored, firmer, and having smoother rind. Considered by some superior to Mediterranean Sweet. It is marketed in July in California. Is yet but little known in Florida.

Velvet Peel.

Whitaker.—The Whitaker orange is the choice of a remarkable grove of trees, planted on Sarasota Bay over forty years ago by Colonel Snell, on the old Whitaker homestead. The trees were from selected Havana seed. The Whitaker is of medium size, sweet, and one of the finest native varieties in the State. Fruit at its best in January and February.

Whitaker No. 2.—By some considered superior to the above. Flavor rich and sparkling; fruit above average in size.

Whitaker Blood.—Skin and pulp dark orange.

White.—Imported. Large pale yellow; flesh pale; flavor rich and good. Bears young.

II.—CITRUS AURANTIUM NOBILIS.

(THE MANDARIN, AND TANGIERINE.*)

This class is characterized by loose rind; segments easily divided; fruit and foliage highly and peculiarly aromatic; trees usually dwarf or half-dwarf.

Bouquet des fleurs.—Possibly not of the Mandarin class, but apparently so. Very ornamental, but fruit of little value.

Canusa.—Sour and practically worthless.

China (synonyms, *Mandarin*, *Kid-glove*, *Tomato*, *Willow-leaved*, etc.)—"Size medium; much flattened; color dark orange; broad, irregular

* The Tangierines are darker colored than the Mandarins, but otherwise I can see no difference. (H. E. VAN DEMAN.)

cavity, with stem obliquely inserted and surrounded by a knobbed eminence; eye set in a large depression one inch wide and five-sixths of an inch deep; longitudinal diameter $2\frac{1}{2}$ inches; transverse diameter 3 inches; skin irregularly ribbed or lobed; color of flesh very dark orange; pulp adhering to skin by a few filaments; sections of pulp easily separated; pulp coarse, juice sweet and highly aromatic; aroma marked; quality first. Tree of original variety introduced by Major Atway from Bayou Sara, La., and now growing in the grove of Dr. Moragne, at Palatka." (Rep. of Com. of Fla. F. G. A.)

Tree thornless, or nearly so. Branches slender, willowy.

China Celestial.

Cleopatra.—Thought by some to be identical with Spice Tangierine, but its identity is hardly decided yet.

*King** (often miscalled King of Siam).—Introduced from Cochin-China, in 1882, by Dr. R. Magee, of Riverside, Cal., and into Florida the same year by Mr. John Carville Stovin, of Winter Park, who obtained buds and two trees of the original importation from Dr. Magee. Fruited last year for the first time. It is described as a large orange, flattened, but not so much as the Tangierines. Skin rough, but general appearance fine; segments and rind loose; fruit juicy; flavor good; membranes of brownish color, but with no bitter taste; color of flesh deep yellow; contains few seeds; rind aromatic. In all respects a superior variety. Attains perfection in June. Tree very thorny.

Mary Bement.—One of the most thorny of the Tangierine class.

Mandarin (Coolie).

Mandarin (Canton).

Mandarin (Dwarf).

Mandarin (Rook's).—"Rooks' Mandarin has the merit of lateness, being now quite juicy (February), while most sorts are getting dry and worthless." (Manville.) Seedling originated by Maj. O. P. Rooks, of Gardenia.

Mandarin (Emperor).—"The tree is similar to the China or Willow, and is supposed to be a seedling of same. Fruit twice the size of the China, but the same in other respects. Good grower and thorny; very prolific." (Wheatley.)

Mandarin (St. Michael's).—"Fruit slightly pear-shaped; in other respects resembling the China." (Manville.)

Mandarin (Spice).—Perhaps identical with Spice.

Mandarin (Thorny).

Satsuma (synonyms, *Unshiu*, *Oonshiu*).†—"A native of the island of Kiusiu, Japan, and named after one of the chief cities of that island by

* Specimens from California and Florida were of medium size, and the flavor tart for an orange, but pleasant. Skin sticks closer to the pulp than common Mandarins. (H. E. VAN DEMAN.)

† After carefully examining many specimens from Japan, California, and Florida, as well as bearing trees in California, I have no hesitancy in saying that Satsuma and Unshiu are identical. (H. E. VAN DEMAN.)

request of Mrs. General Van Valkenburg. The trees of this variety were introduced into Florida by Dr. George R. Hall in 1876, and also by Mrs. VanValkenburg in 1878. The trees were imported direct from Japan. The fruit is medium-sized, flattened, of deep-orange color; smooth, thin skin, which is sweet, aromatic, and easily detached from the pulp; color of pulp, dark orange; segments part freely; fine grain, tender, juicy, sweet, and delicious. There is none of that peculiar rank odor which characterizes most other varieties belonging to the same class and species. The tree is thornless, the leaves peculiarly thick, scarcely lanceolate, serrated, medium, petiole linear, and the fruit is seedless, or nearly so." (George W. Davis.)

The Satsuma has proved the most hardy of all oranges yet introduced. It is a slow grower; habit reclinate and dwarf.

Tangierine (Porter's).—A remarkable seedling originating in Orange County. Almost entirely thornless; a stiff, upright grower; leaves more nearly round than ordinary orange leaves, very large, and peculiarly notched. Fruit described as first-class.

Tangierine, Dancy's (synonyms, *Red Tangierine*, *Bijou*, *Moragne's Tangierine*).—"Size small; much flattened; color deeper and more brilliant than parent variety (China); longitudinal diameter, $1\frac{3}{4}$ inches; transverse diameter $2\frac{1}{4}$ inches; the eye set in a deep cavity seven-eighths in diameter; stalk straight and inserted in a ribbed depression; thickness of skin, three-sixteenths; general properties of pulp same as parent, only superior; fruit nearly seedless. In flavor and external appearance this variety is superior to the original. Seminal variety of the Tangierine raised by Col. F. L. Dancy, Buena Vista, Saint John's County, Fla." (Rept. of Com. of F. F. G. A.)

The foliage of Dancy's Tangierine more nearly resembles that of the ordinary sweet orange than the other varieties of this class; tree thorny; an upright grower.

Tangierine (Spice).—Introduced by Colonel Codrington from Jamaica. Stands a great deal of cold unharmed.

Tangierine (Large).

Tangierine (Small).

Tangierine (Japan).—"A thornless variety of Red Tangierine; of peculiar habit." (Norton.)

The following list of Japanese oranges comprises varieties just introduced by way of California—not yet tested in Florida, and not accurately determined botanically in all cases:

Baka.

Bushiukau. — Buddha - finger
orange.

Dai-Dai.

Jokon.

Jagatara.—Mikan.

Judzu.

Kino.—Kuni, Mikan.

Kiu.—Kunenbo.

Kiku.—Unshiu, Tatchibana.

Kunenbo.

Naruto.—Mikan.

Tou.—Mikan.

Tama.—Mikan.

Tamabuku.—Mikan.

Tatsushiru.—Mikan.

III.—CITRUS AURANTIUM BIGARADIA.*

(The types of this subspecies or variety are the native sour and bitter-sweet oranges of Florida, thought to have been introduced by the Spaniards at the time of or before the first settlement of Florida.)

Bitter Sweet.—"Medium sized; juice sweet and pleasant when separated from the inner bitter rind. Used in summer as a substitute for the sweet fruit. Tree indistinguishable from the *sour*. Native wild orange of Florida." (Manville.)

Bitter-Sweet (Phillip's).—An improved variety of the above, planted quite often as a summer fruit. Brought to public notice by Mr. A. J. Bidwell.

Dwarf Orange.—In most of the State catalogues and reports called *Citrus Japonica*, which seems to be erroneous, as *Citrus Japonica* is the *Kumquat*, according to the best authorities. It is probably the *Citrus aurantium Sinense pumilum* of Galesio.

"An ornamental dwarf tree resembling the sour orange. Fruit resembles the sour, though not nearly so bitter, and is esteemed for preserving." (Manville.)

Sour.—"Large; color dark; grain coarse; inner rind bitter; juice acid. Retains its perfection through the summer, when it is much prized for its refreshing acid juice. Used also for making marmalade and conserves. The tree bears young; very prolific; vigorous; makes a desirable and ornamental shade tree. Native wild orange of Florida." (Manville.)

Sour (Italian).—"Tree thornless and of vigorous habit; makes a fine round head; fruits very young; very prolific. When the fruit is ripe it makes a very fine appearance as an ornamental tree, the fruit remaining on very late in the season. It is esteemed by some for making a drink." (Pierce.)

Willow-leaved (Italian).—This variety is said to very much resemble the Italian Sour, except in foliage, which is willow-like.

Variegated (Sour).—"Leaves and fruit mottled with white, pale straw-color, and several shades of green; highly ornamental." (Manville.)

Variegated (Golden).—Leaves mottled with a rich golden color.

Variegated (Bitter-sweet).

IV.—CITRUS AURANTIUM BERGAMIUM (Risso).

Bergamot (synonyms *Bergamot orange*, *Bergamot lemon*).—"Fruit pear-shaped; pale yellow, with green, subacid, firm, fragrant pulp; fruit and foliage distinct." In Europe the fragrant oil of bergamot is obtained from the rind.

* Escaped from the gardens of the early Spanish settlers in Florida and South America to the forests, and hence by some incorrectly thought to be indigenous in America. (VAN DEMAN.)

V.—CITRUS SINENSE MYRTIFOLIA.

Myrtle-leaved orange.—Evidently a sub-species of *Citrus aurantium*. "A handsome dwarf tree, with small, dense, dark-green, glossy leaves; bearing a small flattened fruit of little use. A beautiful shrub for ornamental grounds." (Manville.)

VI.—CITRUS AURANTIUM SINENSE PUMILUM FRUCTU DULCI (OF GALLESIO).

Probably the Otaheite, grown in Florida as a stock upon which to dwarf the sweet orange. Dr. Kenworthy, of Jacksonville, who first cultivated dwarf orange trees in Florida, used this as a stock, though the Trifoliata is more used at present. It is described by Mr. Manville as "a dwarf variety, bearing an abundance of reddish flowers, and small showy fruit; sweet, and thin-skinned. A pretty ornamental shrub."

VII.—CITRUS DESIMATUS.

Of no probable value for its fruit. Is described by Mr. Manville:

One of the curiosities of the Citrus. Foliage peculiar; leaves of drooping habit; has the appearance of being varnished; no two leaves alike in shape; fine for ornamental grounds.

REMARKS.

The principal stocks in use by the nurserymen of Florida to work the orange on are the seedling sweet orange, the sour orange, and the "French" or Florida Rough lemon. It is claimed by some that trees budded on the sour orange are more hardy than those on the sweet stocks. Others can detect no noticeable difference in their ability to stand cold. Either are good stocks, and both have their adherents. The pomelo or grape fruit is also used to some extent, and is about as hardy as the sweet orange, and a good free-growing stock. The Rough lemon is most desirable on poor land or on low and wet land, as it succeeds better than any other stock in such locations, being a free rampant grower, not particular as to location.

Most nurserymen of the State advocate low budding, so that in case of severe freezes the trees may be banked with earth above the buds, and the variety thus preserved.

The Trifoliata and Otaheite are used as stocks to dwarf the orange, but their culture is not desirable, except on city lots or in frosty localities where protection is needed.

The orange is invariably *budded* in Florida, as grafts do not succeed so well, the operation is not so simple, nor the probabilities of success so great as in the process of budding. In case an orange *bud* does not "take," nothing is lost but the comparatively worthless bud, and in grafting there is great risk of losing the entire top of the young tree,

thus retarding its growth a year or more. The process of budding, too, can be practiced during nine or ten months in the year.

The best growers advocate training the trees into a low bushy head. By this means the trunk of the tree is protected from sun and frost (and is invariably in a more healthy condition than the hide-bound trunks of those trees that are trained not to branch until a height of 6 or 8 feet is reached), and the oranges are more easily gathered than from a tall tree and not so liable to be blown off during high winds. By the low bushy system of training the most healthy head is produced, as in all cases the strongest, thriftiest shoots appear from low down on the trunk. This at least is the case until the tree becomes old. There are many advocates, however, of the system of high pruning, and there is no doubt but what the system has its advantages, not the least of which consists in the ease with which the tree may be cultivated.

The wild sour-orange hammocks of middle Florida have long since been converted into sweet-orange groves by budding them, and no land of this kind remains or is accessible to the prospective orange-grower. Nursery-grown trees are used altogether in planting out groves at present.

The "old-fogy" generation of seedling orange groves has about disappeared, except in the more remote parts of the State, as the advocates of seedling apple trees disappeared years ago in the North before the lovers of improved, well-marked, and superior varieties of fruit. The advocates of seedling orange groves in Florida, are in many cases found to have seedling groves for sale. Many of the finest oranges in the State, too, are native seedlings, and the raising of new and choice seedlings should continue; but this matter can be simplified by budding from the most promising small seedlings onto the branches of large bearing trees, and thus determining the quality of the fruit five or ten years earlier than would have been determined had they been planted out in grove form to grow to the full stature of trees before bearing fruit, and also at a great saving of labor and care and avoiding a risk of total disappointment. The choicest varieties once determined, uniformity and superior excellence are best kept and disseminated by budding.

The orange-wine industry is being developed to quite an extent in Florida; both sweet and sour oranges are used. Perhaps of more importance is the perfumery industry. A company in Jacksonville are doing good work in the development of this important adjunct to orange growing. Sheets are spread under the blooming trees, and the fallen blossoms used for the manufacture of perfumes. Jasmines, gardenias, tuberoses, rose geraniums and other plants are used also.

Perhaps the most popular varieties of oranges being planted at present throughout the State are the Washington Navel, Hart's Late, Jaffa, Maltese Blood, Early Oblong, Mediterranean Sweet, and Majorca, besides the choicest native varieties. The relative merits of many differ-

ent varieties of the orange may be examined and a good idea of their qualities gained by a careful comparison and examination of the complete table of points scored by the fruit on exhibition at the Orlando fair in February last, published in the Florida Dispatch for February 28, 1887.

SHADDOCK, AND POMELO, OR GRAPE-FRUIT.

(*Citrus aurantium decumana*.)

The cultivation of these fruits is extending gradually, especially of the pomelo, which is a first-class marketable fruit, very valuable in the spring and early summer after oranges are about gone, and by many people esteemed equal to the orange at any time. They are mostly very large, coarse fruits, natives of China and Japan, and first brought to the West Indies by one Captain Shaddock, from whom it has taken its name. There are said to be forty or more distinct varieties of the shaddock. In Florida, especially in Hernando, Hillsborough, Manatee, and Sumter Counties, there are many seedling unnamed varieties of the shaddock and pomelo, varying considerably in size, quality, and general appearance. The shaddock tree is one of the most handsome of the genus. The fruit of some varieties occasionally attains a weight of 15 pounds. When the pomelo becomes better known in the northern markets it will become a popular fruit during the spring months. It is prepared for the table by removing the bitter white membranes, and sprinkling the pulp with sugar, when it is a delicious dish. (Various ways of preparing the pomelo, orange, lemon, pine-apple, and other semi-tropical and tropical fruits are given in Miss Helen Harcourt's "Florida Fruits," a most valuable and useful work for any house-keeper.)

VARIETIES.

(The shaddock is also known as Pompelmouse, or Pummelow.)

Bahama shaddock.—"Very large; round; pink flesh; excellent." (Norton.)

Blood (syn. *Pink*).—Very large, with pink pulp. Tree very handsome and strong grower.

"Forbidden Fruit."—Introduced from South Africa by Colonel Church, of Orlando. In habit of growth distinct from any other citrus. New growth slightly tinged with red, as is the lemon. Extraordinarily cooling and refreshing qualities are claimed for the fruit, which has not yet been produced in Florida.

Horton's shaddock.—Large, with green pulp. Habit of tree, spreading.

Mammoth.—Very large, skin smooth and glossy; rind thick, white, spongy, and bitter; pulp green, watery, and subacid.

* *Citrus pomelanus*, when applied to the pomelo or grape-fruit. (VAN DEMAN.)

Pomelo.*—Much larger than an orange and smaller than a shaddock; a delicious fruit, preferred by many to the orange. Skin smooth, pale yellow; subacid. The membrane dividing the pulp is bitter, and must be removed before eating the pulp. Also called "grape-fruit" from its habit of growing in clusters.

Improved Pomelo.

Pernambuco Pomelo.—Has not fruited in Florida. Introduced through the United States Department of Agriculture at Washington.

White-fleshed Pomelo.—Variety from India.

Red-fleshed Pomelo.—From the same source. Recently introduced.

Canton Pomelo.—"Very large, round; red flesh."

KUMQUAT.

(*Citrus Japonica*, Thunberg.)

The kumquat is a native of Japan, and is much cultivated in China also. Its cultivation is extending in Florida. It is very hardy; leaves small, somewhat resembling those of the Mandarin orange. It is a shrub, in cultivation not allowed to exceed the height of a gooseberry bush. The fruit is about an inch in diameter, of deepest orange color, and very handsome. The rind is sweet and the juice acid; delicious and refreshing. The Chinese are said to make an excellent sweetmeat of this fruit by preserving it in sugar. In Florida it is worked on ordinary orange stocks.

VARIETIES.

Oval.—In commonest cultivation. Longitudinal diameter about 1½ inches; transverse, 1 inch.

Round.—Recently introduced.

Kin-Kan.—"A highly-esteemed variety from Japan." (Van Deman.)

CITRON.

(*Citrus Medica Cedra*, Galesio.)

The citron is a fruit almost invariably neglected by the fruit growers of Florida, and though it might become a valuable article of export, even single specimens of the shrub are rarely seen. It is more tender than any of the preceding fruits, and forms a low, straggling bush—rarely over 8 feet in height—but the recumbent branches rooting and extending until a perfect thicket is formed, in which the identity of the parent tree is almost lost. The thick, spongy rind of the citron, when prepared, is the candied citron of commerce. For years the process of preparation for commercial purposes was not understood, but it is said

*This fruit sells in the northern fruit-stores at from 7½ to 15 cents each during the spring and summer, when the main orange season is over. The taste is peculiar, but is soon learned to be liked. To me, nothing is more refreshing on a hot day. The name "grape-fruit" seems much less suitable than pomelo. (H. E. VAN DEMAN.)

that a California firm is preparing it now. Miss Helen Harcourt gives the following directions for preserving citron in her "Florida Fruits":

Dried citron for home or market.—Pick the fruit when green, just as it comes to maturity; cut into four or six pieces; soak in clear water containing a little alum and a few handfuls of green grass (Guinea preferred), or the leaves of the citron tree; pour this off, and boil half an hour in thin sirup, then weigh the citron and add an equal weight of white sugar to the sirup; dip the citron into the latter two or three times; dry in the sun one day; the second day fill the cavities of the citron with the sirup, and continue to expose to the sun until thoroughly dry. This makes an excellent article for commerce, being of superior quality to that sold in the stores at 50 to 60 cents per pound.

Preserved citron.—Never use ripe citron in any shape; it will not dry nor make a good preserve. Take green citron, full-grown but young and tender; cut into four pieces and take out pulp and seeds; lay the citron in salt and water for twenty-four hours; take it out and scald it two or three times until the bitter is extracted; then make a moderately thick sirup, and boil the citron in it gently until clear and translucent; then flavor sirup with lemon juice, allspice berries, stick cinnamon, or root ginger.

VARIETIES GROWN IN FLORIDA.

Lemon citron.—"Shape oblong, like a lemon; size, very large, weighing from 2 to 8 pounds; skin light yellow, rough and glossy; inner skin thick, spongy, and aromatic." (Harcourt.)

Lyman.—A citron imported from the Mediterranean by General H. S. Sanford, and, though imported without name, believed to be the true citron of commerce. Fruit said to be superior to the varieties heretofore grown in the State, "the rind being sweet and edible in a fresh state, and making a most delicious conserve." Named by the Florida Nurserymen's Association, August 9, 1887, in honor of Rev. Lyman Phelps, who brought it to public notice.

Orange.—"Shape round, like an orange; size, large; skin pale yellow, rough and glossy; inner skin white, coarse, and thick." (Harcourt.)

LEMON.

(*Citrus Medica Limonium*, Risso.)

Lemon culture in south Florida is making rapid strides of progress. Well-informed cultivators know that the lemon is a necessity to the people of the United States; that there is a market for every first-class lemon that can be produced, and more, too. Besides being a necessity in cases of sickness, no well-regulated housekeeper in the land considers herself "equipped for culinary campaigns" without lemons in the house. In warm weather no restaurant, saloon, nor street stand can exist without lemons, and plenty of them; no church fair, Fourth of July celebration, or Sunday-school picnic is at all well managed without at least an appearance of lemons; and so it is that such far-sighted men as General Sanford and others imported and planted lemons largely in the last decade.

The time was, and not so very long ago, either, that the most of the people in Florida believed that a marketable lemon, with thin, sweet

rind, first-class acid, and medium size, could not be produced on Florida soil. The only lemons known in Florida were coarse, overgrown seedlings of the Messina and Sicily lemons, the little bushy "everbearing" variety, and the venerable "French" or "Florida Rough" lemon. Strange as it may seem, there are still persons in south Florida who cling, like the dog to the proverbial bone, to the belief that a marketable lemon can not be produced in Florida; but they are within the last ten years comparatively scarce, and there are few now, except the veriest of backwoods "crackers," who do not have at least one or two pet Genoas or Villa Francas in the yard, and still others set out twenty trees, and this man one hundred, and that man five hundred, and so on.

Lemon culture has thus far received the most attention among the progressive fruit-growers of the "lake region" of Florida, though lemons are cultivated to a certain extent all over the peninsula of Florida, and to a slight extent in lower Louisiana, especially in the parish of Plaquemines, where the commercial lemons are now receiving some attention. Florida is indebted to Mr. Bidwell and General Sanford for the first importation of the fine varieties of commercial lemons now attracting so much attention. A great part of General Sanford's large grove at Belair is planted to these lemons, and although it has several times suffered severely from cold, the trees are very healthy and thrifty. On the lower range of keys, so many of which are adapted to the culture of the lime and lemon, none of the fine varieties are yet known, but the knottiest, smallest Florida limes and lemons are grown for the Key West market.

The establishment of such model plantations as that of Messrs. T. A. & E. A. Hine, at Cocoa-nut Grove, will, however, do good service in introducing to that part of the State superior varieties of fruit, and better methods of culture.

One cause, and a just one, of the bad name which Florida lemons have had in the Northern markets, has been the indiscriminate shipment in years past (and in some cases it is still continued) of the inferior lemons so abundant in Florida. Large, fine-looking—so large that one involuntarily thinks of the bunch of grapes borne home from the promised land by the Israelitish spies—but when cut open, not exactly like "apples of Sodom," but similar. The thick, spongy rind that soon becomes bitter on exposure to the air, and the scanty supply of acid, do not speak well for Florida. The fault, however, has only been in varieties planted. To-day Florida produces as fine lemons as grow on the globe. The Villa Franca, Sicily, Belair, and Genoa are the varieties most in favor at present, and all are first-class lemons.*

The lemon is more tender than the orange, shaddock, and pomelo, but not so tender as the lime, which is almost tropical. It is claimed by

*To this I can add unqualified testimony of its truthfulness, as I have frequently and for years past tested Florida lemons by the side of the best from foreign countries. All that we need is more home-grown lemons to drive out or lessen the amount imported. (H. E. VAN DEMAN.)

some that the Villa Franca lemon will stand as much cold as the orange, but this is very doubtful. It is certain, however, that they will bear a much lower temperature than has generally been supposed previous to the freeze of 1886. Lemon trees at that time stood a continued cold as low as 17° and 19° F. in Orange County, and in many cases without material damage.

The crop of lemons in south Florida this year is probably about average. At Orlando the trees are covered with fruit in all stages of growth from blossoms to full-grown lemons, without regard to variety; Villa Franca, Belair, and Sicily lemons. It is stated that Mr. A. L. Eichelberger has three thousand boxes on his young grove at Lake Panasoffkee, and has already commenced shipping. Fair crops are reported in most localities where the commercial lemons are in bearing.

The lemon is worked on any of the stocks used for the orange. It is claimed by many that the lemons on sour-orange stocks will stand a much lower temperature than when budded on any other stock; but this point is undecided, as experiences are contradictory in some cases.

VARIETIES

(CULTIVATED IN FLORIDA)

August.—"Seedling of the Sicily lemon; imported; medium size; smooth, thin skinned; elongated; very good shipping qualities; fine acid; ripens in August." (A. J. Beach.)

Belair.*—"One of the best lemons grown in the State. Has taken several premiums at State and county fairs, and scored the highest number of points at the Orlando exposition in February last. Imported by General Sanford.

Bergamot.—"Large, rough, flattened; of little value; leaves large and broadly winged; appearance peculiar. Erroneously introduced under the name of Bijou." (Manville.)

Bijou.—"Small, smooth, thin-skinned; juicy, acid fine; foliage distinct." (Manville.)

Bracey.—"A new lemon resembling the Sicily, but scarcely equal to it in quality.

Communis.—"Imported by United States Department of Agriculture. Not well tested in Florida.

Eureka.—"Recently introduced from California; of medium size, with sweet rind and strong acid. Tree thornless; strong grower; early and prolific bearer." (Manville.)

Resembling or perhaps identical with Genoa. Often thorny when young.

Everbearing.—"Always in fruit and flower, and consequently valuable for home use. Not a first-class lemon, however. Tree bushy, inclined to sucker from the root; long grown in Florida.

* There are now on the table in this office (October 5, 1887) specimens of this variety that are filled with as strong clear acid as one could desire. (H. E. VAN DEMAN.)

from Europe; strong vigorous grower, few thorns, leaves long and pointed, very hardy; fruit oblong, thin-skinned and of superior flavor; ripens in July and August, and often has a second crop later—in November and December. The best shipping lemon we know.”—(Kedney.

Imported by General Sanford.

Waring's Seedless.—“Very early, good quality, and sometimes a whole tree will be absolutely seedless and thornless, but not perfectly reliable or thoroughly tested yet.” (J. B. Beach.)

“*French*,” or “*Florida Rough*.”—The variety known by this name has been grown from “time immemorial” in Florida and the West Indies. It seems to be identical with the “*Oranged lumie*” or “*Citroned orange*,” the *Citrus Aurantium Indicum*, *citratum Fructu mano*, *Cortice aureo*, *Crasso*, *Amaricante*, *Medulla acida et amara* of Gallesio, described as a distinct hybrid. The fruit has the shape of the orange, but with very rough, uneven skin, and a broad protuberance at the blossom end; the pulp has an agreeable acid, which, however, becomes bitter when bruised or when exposed to the air for any length of time. The pulp separates as readily from the skin as that of a Mandarin orange, and the sections are as easily divided. Its whole appearance, also that of the tree, leaves, and blossoms, correspond almost exactly with Gallesio's description.

It is a very useful fruit for home consumption, though of course it can not be shipped. The stocks are often used for the orange and lemon, which when worked upon it succeed better on many kinds of soil than on other stocks. Orange trees on this stock are as hardy as when on their own roots. The fruit can be used for cooking, and the old lemons hang on in summer almost until the young fruit is large enough to use. In the warm days of early summer the fruit is very healthy and refreshing in a raw state. It is sometimes eaten with salt, but is a real luxury prepared as follows: With a sharp knife peel off all the yellow outer skin from the freshly-picked fruit; then slice the fruit transversely, cutting thin slices, and sprinkle liberally with white sugar; eat immediately, as it will become bitter by standing. The inner rind will be found to be sweet, and with the acid pulp a delicious combination is produced.

The tree has become naturalized in some parts of south Florida, and there are hammocks containing numbers of bearing trees growing luxuriantly, surrounded by thick underbrush and forest trees. If the pulp is available for citric acid, thousands of bushels of fruit could be produced at comparatively small expense.

Variegated French is a variety with the leaves marked with creamy white.

Sweet lemon, also known as *Dulcis* or *Sweet lime*, is the *Citrus Medica Aumia* of Risso. It is not of particular value, and not much grown in Florida.

Everbearing (Sicilian).—A fine lemon of General Sanford's importation. Quality best.

French's Seedling.—"A strong grower; few thorns; fruit of good quality, similar to the imported Sicily." (J. B. Anderson.)

Genoa.—Introduced from California by Mr. Bidwell about six years ago. Originally imported from Genoa, Italy. Thornless when the trees have attained size, but often quite thorny when small. Fruit of medium size, with a sweet rind and a strong pleasant acid. A very early bearer. Ripens the main crop in July and August, and on this account very desirable. A lemon without a superior in the market.

Imperial.—Imported, and not well tested in Florida. Said to be a good lemon.

Leghorn.—A promising variety, of recent importation.

Lamb.—Native lemon. "Tree a good grower; fruit medium size; thin skin; juicy; good acid." (J. B. Anderson.)

Lisbon.—"From California; thought one of the best there; strong grower; thorny; bears well; good fruit." (Kedney.)

Long.—"This lemon originated in San Mateo; is a good grower; prolific bearer; fruit medium size, smooth, good shape, and of excellent quality." (J. B. Anderson.)

Malta.—Introduced recently.

Messina.—Long grown in Florida from seed. Tree prolific, but fruit inferior and of little value compared to the commercial lemons.

Milan.—Scored fairly well at Orlando in February last.

Naples.—Recently introduced. Probably identical with Neapolitan.

Neapolitan.—Introduced through the United States Department of Agriculture at Washington.

Sicily.—Under the name have been grown in Florida many worthless seedlings, with large, coarse, valueless fruit, but the true Sicily lemon of commerce is being planted extensively now. It was imported by General Sanford, and is described as follows: "Size medium; rind sweet; skin smooth, thin, tough, and dense; membrane covering segments of pulp thin and small in quantity; pulp juicy; acid fine; quality best. Tree thornless (or nearly so) and prolific."

Imported also by United States Department of Agriculture at Washington.

Sweet Brazilian.—Introduced by Mr. Bidwell.

Snacco.—Imported by the United States Department of Agriculture. Not much tested in Florida yet. A good grower.

Tuberculata.—Also imported by the United States Department of Agriculture.

Variegated.—Leaves mottled with white. An ornamental variety.

*Villa Franca**.—"At the head of the list we place this kind, imported

* Specimens from Lyman Phelps are as good as the best ever tested. (H. E. VAN DEMAN.)

REMARKS.

The following directions for curing lemons for market are given by Kedney and Carey, extensive lemon-growers of Maitland, Orange County, Fla.:

With regard to curing them, there have been half a dozen so-called patent processes, but we treated ours as follows: Cut when two inches in diameter, pile in a heap on the floor in a dark close room, and cover with a blanket or cloth; let them remain for forty-eight hours; they will then be in a profuse sweat; wipe dry and put on shelves in single layers in a dark room, and keep them for a week or ten days until colored a pale straw-color; wrap, size and pack as oranges and ship, and you will realize highest market prices.

These gentlemen ship their main crop of lemons in July and August, and realize from \$4.50 to \$9.40 per box.

Lemon trees throughout south Florida suffered severely from the freeze of 1886, but in spite of the possibility of an occasional cold snap it is probable the lemon-growing industry will ultimately be of greater magnitude and consequence in south Florida than orange-growing.

The following plan used in curing lemons has appeared in a recent agricultural paper, the experience of Mr. R. W. Pierce, an extensive grower at Indian Springs, Orange County:

The fruit was taken from the trees on the 7th of March last, and was subjected to the following treatment: First, after picking they were dried about one hour, and then well wrapped in two sheets of common orange-wrapping paper, and then closely packed in a tight box, well lined with paper, to exclude all air; then securely nailed, and placed in an inner room which I have in my building, tight, with no windows. Care has been taken to keep the room closed so there should be no sudden change of temperature, which, from its location, would naturally be the case, as no sun can get at it at any time. They were taken from the trees perfectly green of various sizes. In six weeks to two months, they were all colored finely. At the present time I have found no damaged ones. [Letter was written in August.] All are in fine condition, and from present indications would keep for months longer.

THE LIME.

(*Citrus medica limetta*, Risso.)

The lime is perhaps the most tender of all the Citrus trees, consequently its culture is confined to a still smaller territory in Florida than the lemon. The tree succeeds in situations where an orange tree would soon die, being perfectly at home, with good culture, on the low "hard-pan" land so common in south Florida, and also growing luxuriantly on the rocky scanty soil of the keys. At present, Biscayne Bay and Key Largo probably produce more limes than any other localities in the State. The finer varieties are not known, but the common West Indian, or Florida lime, is grown in great quantities. Part of the fruit is marketed in Key West; the rest rots on the ground. People who live in countries where citrus fruits are grown, usually prefer limes to any varieties of the lemon, as possessing a stronger, pleasanter, and more

abundant acid. In consideration of these facts it is strange that limes are not more appreciated in the northern markets.

Previous to the freeze of 1886 there were hundreds of old bearing lime trees in the vicinity of Manatee, producing many bushels of fruit every year. Formerly repeated attempts were made to market them, which invariably resulted in disappointment. In many cases, it is true, they were imperfectly prepared and indifferently packed, but even in cases where the greatest care was used in sorting and putting up very little was realized from the fruit. Either limes are comparatively unknown, and for this reason unpopular at most northern markets, except New York (to which the West Indian limes are more frequently shipped), or dishonest commission merchants embraced the opportunity of "skinning the far-away Florida Crackers."

But this can not always last, for the lime is a good shipper, if properly packed in small boxes, and even then, an ordinary Florida lime contains more juice and of better quality than most lemons.

There is no reason either, except lack of capital to carry it on, why the manufacture of prepared lime-juice and citric acid might not be carried on in south Florida on the most extensive scale. Lime-juice and citric acid are both necessities all over the civilized world, and if their manufacture can be made highly profitable in the West Indies, it can also in Florida.

Lime trees above the latitude of Charlotte Harbor in most cases suffered badly at the time of the freeze, and many were killed to the ground. There are but few trees in south Florida above the keys that are set out in the regular grove form, though nearly every one has a few trees in the yard, and in the lake region the Tahiti lime is being planted in grove form in some cases. There are a few small groves around Manatee, in most cases, however, in a much neglected state. On the lower keys, especially Largo, there are many groves of lime trees, and though they bear profusely, they are neglected and left to their own devices, in consequence of which they are afflicted with all the diseases that the Citrus family is heir to. Above Charlotte Harbor there was no crop of limes to speak of, either last year or this, most of the trees having been frozen to the ground at the time of the freeze in January, 1886.

VARIETIES GROWN IN FLORIDA.

Assam.—Described as a very strong grower. Newly introduced.

Florida.—The ordinary lime cultivated in Florida and the West Indies. Known in California as the Mexican lime. Reproduces itself tolerably well from seed, and is rarely propagated by budding. Size medium to large; skin smooth and very thin; juice rich and abundant, acid and very pleasant.

Imperial.—Newly imported. Said to be first-class.

Persian.—Not tested to any extent.

Tahiti.—A strong grower, and an early and heavy bearer. Nearly

thornless; fruit almost as large as a lemon; juice abundant, acid strong. Tree spreading and handsome.

Seminole.—A new variety received from James Evans, of Fort Myers, Fla., and named by myself as above, because the seed from which the original tree came was planted by an officer during the Seminole war. Large and of excellent quality. (H. E. VAN DEMAN.)

Valentine.—Introduced through the United States Department of Agriculture.

Vereccene.—From the same source.

The following have been recently introduced from the Himalayan region:

Kaghazir, *Knatta*, *Sour Kurna* (an exceptionally strong grower); *Sour Galgal* (good grower); *Sour Jamberi*, *Sour Rangpur*, *Sour Turan*, *Sad-aphal*.

CITRUS MEDICA TRIFOLIATA (Linnæus.)

(Known also as *Limonium trifoliatum*.)

"A hardy species; leaves trifoliate, evergreen; of shrubby habit; thorny; fruit of the size of a pigeon's egg; said to be sweet and edible. Very hardy and desirable as a stock for dwarfing the various varieties of oranges." (Manville.)

The Trifoliata is said to be hardy in mild winters as far north as the latitude of Philadelphia.* It is much used in Japan as a stock.

STRAWBERRY TREE.

(*Arbutus unedo*).

Arbutus unedo thrives exceedingly well in Florida, but is comparatively little known. It is perfectly hardy even in north Florida. Mr. E. H. Hart, at Federal Point, Putnam County, has a tree as large as a good-sized apple tree, which fruits abundantly. It is probable that the tree can be cultivated throughout all the Gulf States. There are but few trees in the South; only met with in choice collections. The following is Rhind's description:

A hardy and elegant-looking evergreen. The leaves oblong-lanceolate and serrated at the edges, the bell-shaped flowers forming a depending panicle, and the ripe berries, both of which are in profusion together in the end of autumn, render this shrub very ornamental at that season. It is a native of the south of Europe, and is also found in a wild state near Killarney, in Ireland, where it has probably been brought originally from Spain or Italy. It, however, flourishes there in a calcareous soil in greater luxuriance than is often to be met with in the woods of Italy. In both countries the fruit is eaten, and in Spain both a sugar and spirit are extracted from it. There are three varieties of the species: the red-flowered, double-flowered, and the entire-leaved.

CAROB BEAN.

(*Ceratonia siliqua*.)

The Carob bean is a tree not much better known than *Arbutus unedo*. The tree is occasionally seen, however, and more might be cultivated,

* Grows well out doors here at Washington. (VAN DEMAN.)

as it grows well and is hardy. Mr. Bidwell, at Orlando, has a good-sized young tree, as also has Maj. A. J. Adams, at Manatee, and now and then others throughout the State and along the Gulf coast westward to Louisiana. The following description of the Carob tree is from a report by Mr. Morris, of Kew Gardens, London :

This tree is extensively cultivated in countries bordering on the Mediterranean, and especially in such as suffer from periodical drought, its long roots penetrating to a great depth in search of water. It is called "Algaroba" by the Spaniards and "Karoub" by the Arabs, whence comes our English name of Carob or Caroub, the pods being called Carob pods or Carob beans, or sometimes sugar-pods. These pods contain a large quantity of agreeably-flavored mucilage and saccharine matter, and are commonly employed in the south of Europe for feeding horses, mules, pigs, etc., and occasionally, in times of scarcity, for human food. The gross export of Carob pods shipped from Cyprus during the last year (1883), according to the European Mail, was over 100,000 pounds sterling.

The Carob tree has thick, shining, pinnately-compound leaves, which are evergreen and very handsome. The foliage is rather straggling and does not make a dense shade.

C. siliqua longissima is a variety with very long pods.

LOQUAT.

(*Eriobotrya Japonica*).

(Syn. *Mespilus Japonica*, *Photinia eriobotrya*, *Photinia Japonica*.)

The Loquat has been known for many years in the South by the misnomer "Japan plum." The name "Loquat," however, is shorter and better, especially since the introduction of the many varieties of true Japanese plums. At the last meeting of the Florida Nurserymen's Association it was voted unanimously that the *Eriobotrya Japonica* be known as the Loquat, and the Kelsey Japan plum simply as the Kelsey plum, to avoid confusion.*

The Loquat has been known for many years in the South ; so long in fact that the date of its introduction can not easily be ascertained.

It is one of the most beautiful broad-leaved evergreens in cultivation; the leaves are very large, 6 or 8 inches in length, undulated, thick and shining. The tree is a native of Japan, and was introduced to Kew Gardens, London, as early as 1787. The blossoms are produced in spikes at the end of the branches in fall or winter, the fruit ripening from March to May. The fruit is yellow, plum-like, of a most delicious acid taste, and contains one or several large smooth brown seeds. The tree is very hardy, but rarely fruits above middle Georgia.

The Loquat is particularly successful in the rich lands of lower Louisiana, where it is extensively planted and is almost a sure crop. The fruit is marketed usually in strawberry-baskets, and brings fancy prices. It rarely finds its way North except to the largest markets, and then in

* It is hoped that all fruit-growers and nurserymen will conform to this wise and needful rule. (H. E. VAN DEMAN.)

very small quantities, but can usually be purchased in southern cities in the spring, particularly in New Orleans. The crop for the last two years has been light in many localities, owing to late and unusually severe frosts having killed the blossoms.

One of the largest orchards of Loquats in Florida is that of Captain James, at Jacksonville, which a few years ago was said to have brought in more cash per acre than any piece of land used for agricultural purposes in the State.

It will grow on the lower keys, but does not seem to be so much at home as on soil with a better foundation and not so subject to long droughts. A very rich moist soil is most favorable for its most perfect development, though it must be perfectly drained, as water about the roots is fatal.

The Loquat is ordinarily grown from seeds, which germinate slowly but readily if planted while fresh. It is also grown from layers and cuttings, and can be grafted on the quince or hawthorn, which are closely related trees. The trees grown in English hot-houses are usually grafted on the English hawthorn (*Crataegus Oxyacantha*). It can probably be worked also on the nearly-related trees of the genera *Pyrus*, *Crataegus*, etc., native to this country.

Mr. E. H. Hart, of Federal Point, who has long been a successful cultivator of the Loquat, tells that the improvement of this fruit by selection of seedlings is very marked. It is probable that superior varieties of the fruit will in time be produced in this way.

VARIETIES GROWN IN THE STATE.

Common.

Giant.—The Giant Loquat has not yet fruited in Florida, but H. H. Berger, of California, the well-known importer of Japanese trees, claims that it is merely the common variety grown on richer soil and under more favorable conditions.

Variegated.—Leaves beautifully variegated.

FIG.

(*Ficus Carica*.)

The fig, succeeding so well everywhere in the South, is still among the neglected fruits. It is a native of the country around the Persian Gulf, Syria, and north Africa, to the Canary Islands. Naturalized extensively in southern Europe. Fig trees are grown occasionally in temperate climates. They were brought to England, it is said, by Cardinal Cole, in 1525, during the reign of Henry the Eighth, and are still in existence, at least were recently found in the gardens of the Archbishop of Lambeth (in the open air, and 50 feet or more in height). The fig is frequently found in the open air in the gardens of southern England, and in this country the roots will occasionally live through the winter in the latitude of Chicago. However, in spite of the advocates

of fig culture in the north in the open air, the profitable and extensive culture of the fig will always be confined to more favored latitudes. It is well known all over the South. In many localities more figs are produced than can be eaten or otherwise made use of, but so far as we know, no attempts have been made yet to dry or preserve the fig for commercial purposes in Florida, except by Mr. S. B. Valls, of Saint Augustine, who several years bought up and preserved sixty bushels of figs per day during the season. Whether his venture was successful or not we do not know.

About four years ago Mr. J. K. Russell, of Olustee, started quite extensively into the business, planting out about 30 acres of fig trees, but after the trees got into bearing, and after interviewing prominent importers of the dried fruit in New York, he decided that the South could not compete in producing dried figs for commercial purposes with the fig-growing countries on the Mediterranean, on account of the cheap labor employed in the production of the imported article. Mr. Russell accordingly destroyed his entire orchard. Nearly all over the South the fruit is produced in the greatest profusion wherever there are trees, and if California can make a success in preparing and marketing the dried fruit, it seems as though there was a fair prospect for the Gulf States also, where irrigation is unnecessary and all the conditions favorable for the growth of the tree. In Louisiana they grow especially well, requiring no care or cultivation, and fruiting abundantly. In the pine lands of Mississippi, Alabama, Georgia, Florida, and South Carolina they require more attention in the way of fertilizing, to produce the best results. In southern Texas, too, they succeed admirably. At Laredo and along the Rio Grande the trees are abundant; in the towns they are seen in almost every yard, and although frozen to the ground nearly every winter, they bear again the next summer. In Laredo the common large white and blue figs are the only kinds much grown, and they are sold at retail about 15 figs for 10 cents. In Florida and Georgia they sell from 5 to 20 cents per quart.

Mr. D. Redmond, of Jacksonville, Fla., is experimenting extensively with figs, and will probably make good use of the results of his experiments.

A few years ago Colonel Elliott, of Jacksonville, put a bushel or two of white figs in quart strawberry-boxes, packed them in a refrigerator, and shipped to New York. They sold at 35 cents per quart, and the dealer wrote that if he would send some choice purple figs they would sell readily at 50 cents per quart. There is little doubt but that the shipment of fresh figs could be made profitable if once this delicious fruit became popular in the northern cities.

The severe freeze of 1886 did not damage fig trees in Florida, except in the case of very young trees or the wood of older trees not well matured. In the other Gulf States the trees are frequently killed to the ground in the winter, except in the case of old trees, which are com-

paratively safe. The shoots from the roots of trees killed to the ground, however, always produce a full crop of fruit the following summer, so the loss of the old tops is not such a serious loss as it would be in the case of most fruit-trees. The Celeste is said by Mr. Redmond to be the hardiest variety of the fig.

Trees are propagated from seeds, cuttings, layers, suckers, or by grafting. The mode usually practiced in the Gulf States is from cuttings. The cuttings are made from the ripened young wood in spring, just before the buds begin to swell. If first "calloused" in damp sawdust or sphagnum, or upside down in the ground (tied in bundles) they are surer.

Fresh figs are everywhere a favorite dish for the dessert, cut, eaten with sugar and cream, like the strawberry. They are also stewed and prepared in almost every imaginable form. Miss Harcourt, in the valuable work before alluded to, gives plain directions for drying figs, also for preparing pickled figs, fig pie, fig pudding, and fig candy. They also make a delicious preserve.

Fig trees succeed best on well-drained very rich land.

VARIETIES GROWN.

But few of the following list of varieties are commonly grown in the South, and not having good opportunities for comparison, it is possible that some known under different names may prove identical or nearly so. The Florida Nurserymen's Association have taken up the matter, and after a few years it is probable that the nomenclature of the fig will be somewhat straightened out. Whether the "White Adriatic" is really one of the true figs of commerce is doubted by some, and it is probable that still choicer varieties remain to be introduced.

A tre Raccolta.

Albo Moster.

Adam.

Angelique (syn. *Early Lemon*).—"Small, greenish-yellow, early." (Berckmans.)

Auvique.

Barnisote.

Barnisotte Grise.

Bellonne.

Black Ischia.—"Medium, blue-black, good." (Berckmans.)

Black Marseilles.

Blue Ischia.—"Large, requires age to become productive; a valuable variety." (Onderdonk.)

Blue Genoa.—"Medium, bluish-black." (Berckmans.)

Biancotondo Grossissimo.

Bourjassate Blanche.

Bourjassate Noir.

Brogiotto.

Black Italian.

Bordeaux.—(Violette de Bordeaux.)

Brunswick (synonyms, *Madonna*, *Hanover*).—"An Italian fig, imported to Brunswick, whence the name; somewhat similar to Mission; it is a large handsome fig, rather broad at the eye; color is brownish-blue; pale on one side; fig is very large; quality fair, but deficient in flavor. This is the common blue fig in San Francisco markets." (Eisen.)

"Very large, violet, good and productive." (Berekmans.)

Bondance Precoce.—"Medium, brown; early and a great bearer." (Benson.)

Black Provence.

Brown Ischia (synonyms, *Chestnut*, *Chestnut-colored Ischia*).—"Large chestnut-brown; very sweet and excellent; very productive and hardy; a good fig; medium early." (Benson.)

Brown Turkey (synonyms, *Brown Italian*, *Lee's Perpetual*, *Howick*, *Walton*, *Brown Naples*).—"Medium, brown; very sweet and excellent; very prolific and hardy. The most reliable for open field culture." (Berekmans.)

Black Genoa.

Castle Kennedy.

Cavaliere.

Celestial (syn., *Sugar fig*).—"Is highly prized for table preserves and crystallizing, and will dry up and improve in saccharine matter and sweetness if left on the tree. The tree grows in all situations and thrives without care." (St. Ceran.)

Col de Signora Nera.

Commercial Smyrna.—"Probably the White Adriatic." (Van Deman.)

Concordana.

Crave.

Col di Signora Bianco.—"Medium; green, changing to yellowish-white; flesh red and most delicious." (Benson.)

Dauphin d'Argenteuil.—"Very large and fine; early." (Benson.)

Dwarf Prolific.—"Dark purple; hardy and very fruitful." (Benson.)

Dattero.

Della Dame.

Dellagocia.

De Constantine.

Di Corju.

Di Gerusalemme.

Di San Gioranni.

Drap D'Or,

Du Rio.

Dottato.

Early White.

Early Violet.—"Brownish purple; very hardy and early." (Benson.)

Early Madeleine.—"Large; skin gray, flesh white; productive and fine." (Benson.)

Foundling.

Green Ischia.—"Green, with crimson pulp; very good and prolific." (Berekmans.)

Gentile.

Grosse Verte.—(Large green.)

Gourand Rouge.

Grossale.

Grosse Grise Bijere.

Hirta du Japon.

Large Purple (synonyms, *Large Blue*, *Common Blue*, *Great Blue*, *Purple*).—One of the best known in the South. Fruit very large.

Lemon.—"Very large, yellow; sweet, and prolific." (Harcourt.)

Long Brown Naples (syn., *Long Naples*).—"Fruit long, pulp red, and well flavored; seeds large."

Large White Genoa.—Probably synonymous with White Genoa.

Le Carpentier's Barcelona.—A large white fig, of delicious flavor, much grown in Bayou La Fourche, Louisiana.

Mission.—One of the early sorts introduced to California. "Small, dark purple." (Van Deman.)

Malta.—Perhaps identical with Celestial.

Madeleine.—A small white variety.

Magnolia.—"A large yellow; our most reliable fig. If killed to the ground by winter or cut down, the new shoots will bear at once, literally over-bearing. This fig will be more profitable farther north than any other. Our first choice." (Onderdonk.)

Mammoth Black.—Probably identical with Negro Largo.

Monaco Blanche.

Moscadello.

Nerii.—"Fruit rather less than the Marseilles and longer in shape; skin pale greenish-yellow; pulp similar in color to that of a pomegranate; there is in its juice a slight degree of very delicate acid, which renders it peculiarly agreeable to most palates."

Negro Largo.—"Exceedingly large; jet black, marked with ribs; very delicious." (Benson.)

Nano Bianco.

Pregussata.—"Fruit large; pulp deep red, remarkably sweet and rich; seeds unusually small." Originally from the Ionian Isles.

Pasteliere.

Prolifero.

Pacific White.—"Medium, white; very sweet; seeds small; will dry on the tree sufficiently to pack away with safety. Is of fine quality, but rather thick skin; very hardy; wood of a dark chestnut color. Foliage large and beautiful; tree vigorous and productive." (Benson.)

Purple Genoa.—"Fruit large; pulp extremely sweet and luscious."

Riproduttivo.

Rocardi.

Ronde Noir.

Rond Violet Hative.

San Pedro (syns., *Fico di San Pietro*, *Apple fig*).—"The largest and handsomest fig in existence, with excellent flavor and sweetness; skin white and thin; meat white; as a table fig this one is unequaled, and will exclude all other figs in the market. Bears early and profusely." (Eisen.)

The San Pedro fig drops badly in Florida, though perhaps on older trees this would not be the case. It has been introduced but a few years. It is one of the strongest-growing figs known.

Small blue (syn., *Little Blue*).—"Fruit below medium; pulp red, of good flavor."

Small Brozon Ischia.—"Fruit small; pulp purple, of a very high flavor; leaves less divided than most other sorts."

Small Green (syn., *Little Green*).—"Fruit small; skin, green and thin; pulp red and excellent; the tree a low grower, hardy, and a very good bearer."

Small Early White.

Violette.—"Fruit small; pulp near the skin, white, interior tinged with red."

Verdino di Breanza.

White Adriatic (syn., *Verdino*).—Introduced from Sicily by way of California. We quote introducer's description: "This is a local name for one of the most celebrated figs in the world, producing the finest Smyrna figs of commerce, identical or similar to the brand known as *Erbelli*. It has been introduced into this country from south Italy, and is there esteemed the finest of all figs. The tree attains an enormous size, forming a large dense head of an umbrella-shape. The growth is very rapid. The foliage is dense; the leaves evenly lobed and glossy, of a fine lustrous, not somber, green. As a shade tree it is unsurpassed, and a finer avenue tree cannot be imagined. In growth, foliage, and color it is entirely different from any known as Smyrna. The Adriatic is equally fine for the table. It is eaten fresh, and is a most delicious fruit. The fruit is of the very finest quality; the skin is thin like tissue-paper, thinnest at the base of the fig, and not like most other figs, thicker at that point. In examining the finest dried fruit of commerce they will all be found to be split at the base, caused by the thinness of the skin. The Adriatic when dried and subjected to strong pressure in boxes acts similarly. The pulp is like a quantity of oily honey. The seeds are small. There is no hollow space in the center of the fig, but the whole fruit is the solid pulp. The size of the fruit is large—as large as any imported fig. The fruit begins to ripen in July, and figs ripen from that time continually until frost. The principal crop is in August and September. The color of the fig when dried is amber, and,

similar to imported figs, it covers itself with a fine flowery bloom. The quantity of figs produced is enormous. The branches are actually loaded down with fruit; no tree could bear more. It will bear tons of fruit when old. The tree begins to bear the year after it is planted; some trees bearing a few figs the first year. From the second year the crop continually increases." (Eisen.)

The Adriatic fig has fruited for several years in Florida. It grows vigorously, fruits freely, but there is a difference of opinion as to its quality; some place it above all other varieties, while others do not award it quite so high a place.

White Celeste.—"A small white fig, with fair flavor and sweetness. As a fruit and shade tree the White Celeste is valuable. As a fruit tree alone it has many superiors." (Eisen.)

White Genoa.—"Skin very thin; meat fine and sweet; fruit slightly smaller than the Adriatic." (Eisen.)

White Marseilles (synonyms, *Marseilles*, *Pocock*, *Figue Blanche*).—"Fruit small; skin, pale green; flesh white, dry, sweet, and rich." Well known in the South. Very strong grower, but does not bear so early as many varieties.

White Ischia.—Probably synonymous with Yellow Ischia.

White Smyrna.—"Very large, dirty white; of good flavor; productive and hardy; not good for drying." (Benson.)

White Trojan.

Yellow Ischia (syn., *Cyprus*).—"Fruit large; skin yellow; pulp purple and well flavored; leaves large and not much divided."

As mentioned before, most of these varieties are of comparatively recent introduction, not more than half a dozen being in cultivation throughout the South. Until they are thoroughly tested and compared it will be impossible to sift out the names under which they have been imported at different times.

HOVENIA DULCIS.

This newly introduced fruit from Japan is described as follows by H. H. Berger:

A stately tree, resembling in habit the wild pear tree of Europe. The leaves are similar to those of our mulberry tree in shape and texture. The small whitish flowers appear in July. The fruit is produced by the three divisions of the inflorescence thickening and becoming fleshy. It is edible, and has a sweet and very aromatic taste, resembling much the fruit of the Carob tree; also in flavor similar to the Bergamot.

Recently introduced to Florida, and not yet tested.

MAY-APPLE, MAY-POP, OR FLESH-COLORED GRANADILLA.

(*Passiflora incarnata*.)

Our hardy native Passion-vine is occasionally cultivated in the South, but it easily becomes unmanageable by reason of its subterranean creeping root-stocks or under ground-stems. The root is perennial and

hardy over most of the United States; flowers bluish; fruit greenish or flesh-colored, with pleasantly acid pulp. Perhaps not strictly semi-tropical, but the fruit is not often seen north of Tennessee.

PRICKLY PEAR.

The Prickly-pear is the fruit of various species of *Opuntia*. The most valuable is *Opuntia Tuna*, of Mexico, West Indies, and south Florida. The plant is used in Mexico as a hedge plant, for which it is very valuable. It is said to reach an ultimate height of 20 feet, but in Florida it rarely attains a height of more than 5 or 6 feet. The flowers are purplish-yellow, followed by great quantities of purple fruit 2 inches or more in length, which is beset with minute prickles and must be carefully peeled before eating. The pulp is brilliant purple, quite juicy, and with a subacid taste. The plant is not cultivated for its fruit in Florida, but in localities where it is wild in abundance it is used quite extensively for preserves, jelly, etc., and the juice is sometimes used to give a beautiful purple color to orange jelly. The *Opuntia* is quite hardy, bearing slight freezing unharmed.

INDIAN FIG.

(*Opuntia Ficus-Indicus*.)

This cactus is a native of the West Indies, and has escaped from cultivation on the island of Key West. It is not elsewhere found wild in Florida, but is cultivated to a slight extent, both for its grand scenic effects in semi-tropical gardening and for its fruit. The species has very large joints, ovate or oblong, from which the scale-like prickles drop off when young, leaving the plant smooth and free from spines. It grows to a height of 10 feet, and produces yellow fruits, which are eaten raw or used for jellies. The fruit is sometimes shipped from the West Indies to the New York market. The Indian fig is very hardy, and has never been injured by cold in South Florida.

OLIVE.

(*Olea Europaea*.)

Olive culture in the South has made no extensive progress, and yet the indications are favorable for the further development of the industry that will doubtless be an important one.

As in the Report of the United States Department of Agriculture for 1877 there appears an exhaustive treatise on the uses and cultivation of the olive, it will only be necessary for us to state that the olive was first introduced into the southern States in 1755 by a gentleman of Charleston, S. C. Again, in 1829, Mr. Robert Chisholm, of the same State, again imported olive trees, some of which are still bearing. The Minorcan colony that settled in Florida in 1769 also brought the olive.

There is a bearing olive orchard on Saint Simon's Island, Georgia, owned by W. R. Shadman, who reported very favorably of the results obtained there. General H. S. Sanford some years ago imported a collection of olive trees, and since then Mr. A. J. Bidwell has imported trees. Other importations have probably been made, as olive trees are not very uncommon throughout the State, and there are a few bearing trees. Young trees can be obtained from some of the nurserymen in the State home-grown, and are being planted out in numbers of instances. Mr. G. L. Taber, an enterprising nurseryman of Glen Saint Mary's, Baker County, Fla., last year propagated about 1,500 olive trees. Mr. Bidwell's trees at Orlando, which have been planted out only four or five years, produced some fruit last year, but most of it dropped off before maturing.

The olive seems well adapted to the climatic conditions and soils of all the Gulf States; it will stand ten degrees more cold than the orange tree, and can be cultivated almost anywhere in Texas, Louisiana, Mississippi, Alabama, Georgia, Florida, and South Carolina. In Louisiana the Mission and Picholine varieties are about the only kinds grown. So far as we know, the olive trees in the southern States were not injured by the severe cold wave.

VARIETIES.

The following list of varieties includes the choicest in cultivation in southern Europe, many of which have been introduced into our southern States. The varieties of the olive are very numerous in countries where it is much cultivated, as in case of any long-cultivated fruit.

For the descriptions we are indebted to various nursery catalogues and standard works on the olive:

Atroviolacea (Brun).—Fachonille of southern France. Vigorous; oil first quality. Size large; it is preserved in France when overripe and black, and dried in the sun.

Argentata (*Nevadillo Blanco*; *Doncel*; *Zorzalena*; *Moradillo*; *Ojiblanco*; *Olivo Lucio*).—Spanish variety. Fruit broad ovate, an inch long, very blunt, not oblique. Quality and quantity of oil excellent.

Angulosa (*Galliningue*; *Laurine*).—A French variety, used for preserves.

Atrorubens (*Salierne*; *Saverne*).—French variety. Fruit dusted white. Furnishes one of the best of oils.

Atrovirens (*Pointue*; *Punchuda*).—French variety. Fruit large, with good oil.

Alba (*Olive Blanche*; *Blancane*; *Vierge*).—A French variety. Inferior in quality.

Bellotudo (*Villotuda*).—Spanish variety. Fruit about an inch long; egg-shaped; pericarp outside dark red, inside violet.

Bermillaon (*Vermillon*).—French variety; very hardy, and yields good oil.

Bouquettier.—Yields superior oil.

Cayon (*Varal negro* ; *Alameno* ; French, *Nasies*).—A small-sized tree, which comes into bearing when three or four years old, but bears a good crop only every alternate year ; oil fine, with some aroma. Fruit violet-black, spotted, globose ovate, nearly an inch long, somewhat pointed.

Courniau (*Courniale* ; *Plant de Salon*).—Very prolific ; fruit small ; oil excellent.

Colchomuaa.—Fruit spherical, outside red, inside whitish, an inch in diameter, slightly pointed. Produced good oil in large quantity.

Carrasquena (*French Redouan de Cotignat* ; *Redouanou*).—Fruit black-red, almost spherical, about an inch long. Valuable both for oil and preserves, but liable to be attacked by various insects.

Ceratocarpa (*Cornexuelo* ; French, *Odorant* ; *Luquoise* ; *Luques*).—Fruit an inch long, oval, pointed.

Caillet Rouge (*Figanier* ; *Columbella*).—Small tree ; fruit large, red. Oil good, and produced in quantity.

Caillet Blanc.—Fruit almost white, produced annually and copiously, yielding a rather superior oil.

Cotignac (*Pardigniere*).—Fruit middle-sized ; blunt. Oil obtained in quantity and of excellent quality. Requires much pruning.

D'Ogni Mese.—An Italian variety, which ripens fruit several times in a year ; furnishes a pleasant oil. Fruit is used for preserves.

Empeltre.—Spanish variety. Fruit ovate, an inch long. Rich in oil of excellent quality ; also one of the best for pickles. Pericarp outside violet, inside whitish.

Hispalensis (*Gordal* ; *Ocal* ; *Olivo Real*).—Spanish variety. Fruit black-gray, oblique, spherical, measuring about an inch. Rather large and quick-growing tree. Fruit used in the green state for preserves ; not used for table oil.

Javaluno.—Fruit black-gray, over an inch long, egg-shaped, somewhat oblique, gradually pointed. Rich in good oil ; also useful for preserves, but much subject to attacks of insects.

Le Palma.—French variety. Oil very sweet, but not largely produced.

Macrocarpa (*Belgentier*).—Fruit large, oval. Oil inferior in quality ; used only for pickles.

Mission (*California*).—Introduced into California by the Jesuits over one hundred and sixty years ago, and some of the original trees are still standing, it is said. Oil of good quality. Fruit of medium size ; ripens late.

Mourette (*Mouraou*).—A large tree, furnishing oil of good quality.

Maxima (*Madrileno* ; *Olivo Morcal*).—A late-ripening Spanish variety, not very hardy, comparatively. Fruit over an inch long, cordate-globose, strongly pointed. Less valuable for oil than for preserves.

Niger rima (*Kapugom*).—Fine oil. Medium-sized fruit.

Nevadillo negro.—Fruit egg-shaped, fully an inch long with turned

pointed apex. One of the richest of all varieties in yield. A Spanish variety, but quite hardy, and not late in ripening.

Ojillo de Liebre (*Ojo de Liebre*).—Fruit nearly round; violet-black; 1 inch.

Oblonga.—Long oval fruit. Good quality of oil.

Pendulier.—Tree large, with long drooping branches. Oil first quality.

Pendulina (*Boussalu*).—Oil extra fine. Fruit medium size; pickled green. Perhaps identical with *Pendulier*.

Picholine (*Ovalis*; *Lechin*; *Acquillo*; French, *Saurine*).—Fruit broad oval, two-thirds of an inch long. A copious yielder. By pruning its top branches this variety is made to spread over eight yards square or more; of weeping habit; yields a good oil and fair quantity, and resists the attacks of insects well. This variety is much cultivated in Italy, is a favorite in California, is quite hardy, and is being planted out in Florida and the Gulf States more than any other variety. It is known by its name *Picholine* in Florida and Louisiana, and by this name and also as Italian olive in California.

Polymorpha (*Pleureur de Garss*).—Fruit large; oil good.

Præcox (*Repugnier*).—Medium oval fruit; oil extra.

Pomiformis (*Manzanillo*, or *Queen Olive of Spain*; French, *Ampouleau*).—Fruit over an inch in diameter, spherical, shining black. Putamen broad and truncate; used both for pickling and oil.

Picudo (*Fetudilla*).—Fruit fully an inch long, egg-shaped, blunt at the base, pointed at the apex, with black-gray pulp. Pericarp easily separable. Used both for oil and preserves.

Regalis (*Sevillano*; French, *Pruneau de Catignac*).—Fruit 1 inch in diameter, ovate spherical, blunt; bluish-black. Only for pickles; oil of third quality. Also known as *Ronde de Languedoc*.

Redondillo.—Fruit ovate-spherical, nearly an inch long. Pericarp outside bluish-black, inside whitish. A rich yielder.

Rafa (*Becu*).—Productive. Olives large, round; oil of good quality, freely produced.

Rubra (*Caillon*).—Very vigorous in its production of wood and fruit; fruit medium size; oil first quality; by some preferred to all others. The fruit, when pickled green, must be salted; can also be pickled when ripe.

Racinal (French, *Bouteillan*; *Boutiniene*; *Ribien*; *Rapugette*).—A Spanish variety, early ripening, hardy; fruit violet-colored, globose-ovate, about an inch long; neither pointed nor oblique. Bears regularly also on less fertile soil.

Rostrata (*Cornicabra*; French, *Cournaud*; *Corniaud*; *Courgnale*; *Pl. de Solon*; *Pl. de la Fane*; *Cayon Rapunier*; *Grasse*).—Strong and tall; hardy. Fruit blackish-red, over an inch long, oval, much pointed. Oil good, but fruit not so easily picked on account of the height of the tree.

Rouget (Marvailletta).—A French variety, producing fine oil.

Rubicans (Rougette).—Yield annual and large. French.

Raymet.—Fruit large, reddish. Oil copious and fine.

Uvaria (Rapugnies).—Large fruit; oil extra quality; fruit pickled green.

Varal Blanco (French, Blanquette).—Fruit ovate-globular, three-fourths of an inch long, neither pointed nor oblique, outside blackish-red. A variety with low-growing branches, which enable them to be picked by hand. Yields a particularly sweet and delicate oil.

Verdego (Verdial; French, Verdai; Verdai).—Fruit black-violet, oblique, spherical, pointed, about an inch long. Furnishes good oil. One of the most hardy of all varieties; branches low-growing; fruit good for preserves.

Variegate (Marbrie; Pigale; Pigan).—Purple fruit with white spots. French variety.

DATE PALM.

(*Phoenix dactylifera*.)

There is not one date-palm tree along the southern Gulf coast and the lower Atlantic, where there ought to be a thousand. Indeed, it is almost possible to count the *bearing* date palms in the South on one's fingers and toes. Combining, as it does, the beautiful and the useful in such a high degree, it is strange that it has not been more planted.

The date palm is more hardy than the orange tree, enduring perfectly the climate of the Gulf coast from the Rio Grande to Cape Sable, and hardly almost as far north as some of our native palms. For many years bearing trees have flourished on some of the sea islands on the coast of Georgia, and the date palms of Saint Augustine are famous, but elsewhere throughout the South bearing trees are rarely met with. The date palm attains a great age, and is celebrated in this respect almost as much as the olive tree. It is said that "trees of from one hundred to two hundred years old continue to produce their annual crop of dates," and some of the famous "palms of Bordighera," in Italy, are known to have been planted by the monks over a thousand years ago. The date is native in north and central Africa, Arabia, and Persia. It has been long cultivated in southern Europe along the Mediterranean, and grows even in the south of France, though in that high latitude rarely fruits.

The town of Elche, in Spain, is surrounded by an old date forest of 80,000 trees, and the sale of the fruit and the leaves for decorative purposes constitutes the principal income of the town. At Alicante there are also immense planted forests of the date palm. There is nothing to hinder the formation of such extensive forests of the date palm in Florida and the lower South—nothing except modern American impatience, which can rarely wait patiently even for a budded orange tree to come into bearing. The date palm is propagated both from seeds and by suckers from the roots. The superior varieties can only be increased

with certainty in the last mentioned way. The age necessary to be attained before coming into bearing varies greatly according to soil, climate, variety, and other circumstances often unexplainable. Trees have been known to bear in this State when only four years old from the seed, but this is the exception, as they rarely blossom under ten years of age, and often perfectly healthy trees are said not to produce fruit before they are fifteen to twenty-five years old. When root suckers or offshoots are planted they are said to commence bearing in five or six years.

The date palm, as is well known, is pinnate-leaved; leaves bluish-green and very beautiful. The tree, with great age, attains a height of 80 feet, but its growth is exceedingly slow. In Florida there are large trees, some of them fruiting in Jacksonville, Saint Augustine, Tampa, Manatee, Key West, on Key Largo, lower Matacombe, and at other points in the State. The number of young plants being put out at present is quite considerable, it not being uncommon for one person to plant out 25 to 100. Occasionally an avenue of dates is planted, destined to become not only a "thing of beauty" but almost "a joy forever."

Though the date grows very slow, it is but a few years after planting in fertile soil until it becomes a grand ornamental plant, which fact should altogether atone for its slowness in fruiting.

The seeds should either be planted where the trees are to stand, or else cultivated in pots for a few years before planting out. The palm can, of course, be transplanted from the open ground, but usually recovers slowly after this operation, and much time is lost. The best way is to cultivate in pots for a few years, in very rich soil, shifting as often as becomes necessary, and giving slight protection from sharp frosts, and when finally planted out it can be done in the spring, thus giving the plant a chance to become thoroughly established in the ground before winter, and better able to cope with cold weather. Even the young plants, however, are rarely seriously injured by cold below Jacksonville.

The offshoots can be taken off as soon as they begin to form roots for themselves, deprived of leaves, and kept moist and shaded for a few months. They will rarely grow much, however, inside of a year.

On Snead's Island, at the mouth of the Manatee River, a few years ago, stood two date palms, male and female, about 30 feet in height, whose history (although Manatee has been settled about forty-five years) was completely unknown. They were thought to have been planted by the Spaniards or freebooters who frequented the coasts many years ago, before any settlement existed on the west coast. The female tree bore full crops of fruit every year until about four years ago, when a would-be sportsman, in trying to cut off the clusters of fruit with a rifle-ball, shot through the bud of the palm and killed it. In some parts

of the world it is a criminal act to willfully destroy the date tree, and the enactment of a similar law is worthy of consideration by Floridians.

On lower Matacombe Key are two very large date palms, the time of whose planting is unknown to the present inhabitants of the keys, but which were undoubtedly planted by Dr. Perrine over fifty years ago, when he lived there and worked to introduce useful tropical and semi-tropical plants into the United States—(efforts nearly forgotten and but little appreciated by Floridians of to-day, but not without great results, not the least of which was the naturalization on the coast of Florida of *Agave Sisalana*, the true Sisal hemp, undoubtedly destined to become as great a source of wealth to Florida, when once capital and attention shall have been turned towards it, as to her fruit interests). Dr. Perrine perished in the historical massacre of Indian Key, but previous to his death, during his one or two years' residence on the keys, he had introduced hundreds of rare and useful plants, many that have not been again introduced. Most of these perished during the neglect of years—fire, war, and vandals having done their work; but at least three important plants remain monuments to Dr. Perrine's memory, striking examples of the survival of the fittest—*Agave Sisalana*, *Aloe vulgaris*, and *Phœnix dactylifera*.

Mrs. Hester P. Walker, the only surviving daughter of Dr. Perrine, now living in Fernandina, Fla., tells us that at one time her father bought a sack of dates and distributed them, on the sole condition that the seeds should be saved and returned to him, and that he afterwards planted them in many places.

The two date palms are now the property of Key West parties, and a young cocoa-nut plantation surrounds them. The bases of the trunks are surrounded by an impenetrable *chevaux-de-frise* of the suckers, forming a mass of leaves 20 feet across and hundreds in number.

The following description of the preparation of dates for market, etc. is from Whitner's Gardening in Florida:

Large vats, holding about one ton each, are gradually filled with fruit, which is trodden down by men and women, water being added from time to time to soften the fruit. The surplus sirup or juice is then drained off to be used for culinary purposes, as molasses, etc., the residue being made into large cakes, which are covered with matting, and shipped to the various markets of the world. Fermented date fruit makes a palatable wine; so also does the sap or juice of the tree, which is obtained by tapping, as in making sugar from the maple. Date sap is likewise converted into sugar by the usual process of evaporation. The tree is tapped a little below the lower leaves of the crown. A full grown tree it is estimated will yield 2 gallons of sap a day for three months, commencing the first of November.

It is said that in Egypt a yield of 400 pounds of fruit has been harvested frequently from one tree in a single season.

At Mr. Samuel Johnson's plantation, on Key Largo, are half a dozen fine young date palms, one of which, now seven years old, we saw with three large clusters of fruit on it in June. And Mr. Johnson told us that it had borne fruit four years, commencing when the tree was three years old.

All authorities unite in declaring that the date palm is dioecious ; and so it seems to be usually, but we think that now and then a specimen must have perfect blossoms ; for Mr. Storter, at Chuckaluskee Bay, south Florida, has a fine young date palm, with no other blooming trees within miles of it, which last year produced fruit when only five years old.

It is stated that to produce the best results the blossoms of the male tree are shaken over those of the female ; but is it not possible that this operation may really be as useless as the "caprification" of the fig in the East ? It is stated that one male tree is sufficient for fifty females.

VARIETIES.

The varieties of the date palm are said to amount to nearly a hundred in the East, where they are much grown. In Florida but little attention has been paid to varieties, though two or three importations of named trees have been made. Most of the following sorts are growing in Florida, and perhaps others :

Assonad.

Bussorah.

Black (syn., *Goliath*).—The ordinary date of commerce.

Gomera.—Fruit large and seedless.

Menchick.

Ribon.

White African.

Yellow Rosetta.—"Preserved in layers like Muscat raisins, it is sold at a high price in London and Paris, and also in the principal American cities under the name of Sugar dates." (Whitner.)

Zadie.—This variety produces the heaviest crops, it is said ; often 300 pounds to the tree.

OTHER SPECIES PRODUCING EDIBLE DATE FRUIT.

Phoenix farinifera, Roxburgh (*Phoenix pusilla*, Gaertner).—A very hardy species, native of India and south China. Berry described as "shining black, with a sweet mealy pulp." Is said to prefer the vicinity of the sea. A dwarf species.

Phoenix reclinata, Jacquin.—Prior to the freeze of 1886 I saw magnificent young specimens of this popular decorative palm at General Sanford's "Belair Grove," at Sanford, but have not seen them since, and do not know how they came through the freeze. Very small specimens at Manatee were apparently killed by this freeze—even the bud leaf pulling out easily—but with the approach of warm weather they completely recovered. This palm is a native of south Africa, particularly Natal, and produces edible berries. Not a tall palm.

Phoenix Sylvestris, Roxburgh.—The Wild date of India. A magnificent tree, very hardy, and much esteemed in India for the palm sugar

which is made from it. It is said that 50,000 tons of palm sugar are produced annually in Bengal alone from this and some other palms. The palm is not sacrificed by the process, but can be used in this manner for fifty years. Berries yellowish or red.

Phoenix Spinosa, Thonning.—A native of tropical Africa, but said to ascend to considerable elevations. It is said that the green bunches, if immersed in water for half a day, suddenly become of a scarlet color, and the astringent pulp becomes edible and sweet.

Nearly all the palms of the extensive genus *Phoenix* are hardy in Florida, and succeed better than any other class of pinnate-leaved palms. It is remarkable that some, though natives of countries directly under the equator, are among the most hardy sorts. Nearly every edible species of *Phoenix*, and the best collection of hardy palms in Florida, can be seen in the grounds of Mr. E. H. Hart, at Federal Point, Fla., many of them very large specimens. Mr. Theodore L. Mead, at Oviedo, also has a fine collection.

Isolated specimens of the date palm are occasionally seen along the Gulf coast in the parishes of Terre Bonne, Saint Mary, Cameron, and Plaquemines, La., but they are not commonly planted yet, nor are they anywhere in the Gulf States.

POMEGRANATE.

(*Punica granatum*.)

In the Florida Dispatch for August 29, 1887, appeared an essay on the pomegranate, read before the Florida Nurserymen's Association at Palatka, August 9, 1887, by Mr. D. Redmond, of Jacksonville, that is throughout so interesting, and so well describes this much-neglected fruit, that we can not refrain from copying parts of it; describing, as it does, the pomegranate in so much better words than any I could use. Mr. Redmond says:

The pomegranate, which Downing characterizes as "unique" among fruits, and pronounces "the most singularly beautiful one that ever appeared at the dessert," is a native of western Asia, but has long been cultivated in southern Europe, the East and West Indies, and North and South America. Like the fig, it can claim a place in the very earliest annals of the world, and was used in the time of Solomon as a pattern for embroidering the costly garments of princes and to embellish the most ornate and splendid architecture. Before the peach, the nectarine, and the apricot had traveled from Persia to the more western countries on the borders of the Red Sea, the pomegranate was there assiduously cultivated and held in the greatest esteem. In the wilderness, when the children of Israel murmured for the fruits of Egypt, they exclaimed, "It is no place of seed, or of figs, or of vines, or of pomegranates." On the borders of the promised land, Moses described it as "a land of wheat and barley and vines and fig trees and pomegranates; a land of olive-oil and honey." In the Canticles, Solomon speaks of an orchard of pomegranates with pleasant fruits." Throughout other parts of the Bible also we find many pleasant allusions to the pomegranate; and heathen mythology has furnished us with a very beautiful legend respecting this fruit, which is thus told by Bapin, the French poet: "Bacchus once beguiled a lovely Scythian girl, whose head had been previously turned by the diviners having

prophesied that she would some day wear the crown, and who therefore lent a willing ear to his suit. The fickle god, however, not long after, abandoned her, when she soon died of grief. Touched at last, he then metamorphosed her into a pomegranate tree, and placed on the summit of its fruit the crown (calyx), which he had denied to his mistress while living." A tree, therefore, which partakes of the antiquity of the fig, the vine, and the olive, and which in point of utility is numbered with the grain-bearing plants and with honey, all constituting the principal food of the nations of antiquity in their early stages of civilization, should possess for us no little interest, and is surely worthy of our especial attention.

Like the fig, the pomegranate is readily propagated by layers, cuttings, and seed. It is quite hardy in all of the Gulf States and even farther north; it is an early and very prolific bearer; very graceful as a large shrub or tree in form and foliage; and produces a great profusion of strikingly brilliant and lovely scarlet flowers.

The pomegranate is well known to most residents of Florida and the South, and very highly admired and esteemed by many, and yet must be classed with the fig among the too-much neglected fruits. A few words as to its uses and prospective value may therefore be appropriate.

The sweet pomegranate, when in perfection, possesses a fresh crispness, delicacy, and sprightliness of flavor almost unrivaled among fruits, and is considered a great luxury by all who obtain it; but with us, unfortunately, the season is very short, and the fruit quite perishable. In Rhind's Vegetable Kingdom we are told that the ripe fruit of the pomegranate is in great abundance in August at Aleppo, and that it is then "laid up for the winter stock." [I must remark here that, so far as I know, this art of keeping the ripe pomegranate a considerable length of time does not seem to be known among us, though such knowledge is very desirable.] In Syria the sweet pomegranate is cut open, the seeds taken out, stewed with sugar, sprinkled with rose-water, and served on little plates. An infusion of the crushed seeds in cool sweetened water is often used in the sick-room; and a very delicate wine was extracted from these fruits by the ancient Jews, as may be inferred from the words, "Grath Rimmon," signifying the press of pomegranates. The pulp-enveloped seeds are often used in the manufacture of jellies, preserves, and sirups; the rind of the fruit is used in medicine as a tonic and an astringent, and the bark of the tree produces the dye which imparts its peculiar color to the morocco leathers of commerce. The pomegranate thus combines the *utile cum dulce* in a very great degree, and has no rival whatever as an ornamental and decorative fruit.

Downing said of the pomegranate, more than thirty years ago, that "it deserves to be much more popular than it now is in every southern garden; and if raised in large quantities here it would become a valuable fruit for sending to northern cities, as it is now constantly sent from the south of Europe to Paris and London."

In confirmation of Mr. Downing's opinion, I may say that I shipped an average lot of pomegranates, well packed, to New York some years ago, and received for them more than the common price of oranges. I know this beautiful and fine fruit can be abundantly raised in all parts of Florida. I believe that a large demand for it can be easily created both North and South by a good article supplied in abundance; and I commend the improvement, fuller development, and increased culture of both the fig and pomegranate to the special attention of this practical and progressive association.

The pomegranate is perhaps more grown in Louisiana and southern Texas than in other parts of the South. In Ouachita Parish, La., sweet pomegranates were badly killed back by the freeze of 1886, while the common sour variety was not injured in the least. We have noticed also here at Manatee, Fla., that the small sour trees in the nursery were much more hardy than the sweet ones, for although, as Mr. Redmond says, the pomegranate is usually hardy all over the South, at this com-

paratively low latitude they usually keep growing briskly all winter, and when a "norther" occurs, followed by a severe freeze like that of 1886, even the young pomegranates are sometimes injured; more so, evidently, than if their rampant growth had been checked by cool weather in the fall. The pomegranates of northern Mexico and southern Texas, along the Rio Grande, are acknowledged to be superior to most of those grown in the South by all who have eaten them. Finer varieties have probably been produced here by selection of seedlings, as the pomegranate there would naturally afford more opportunities for the selection of the best sorts. In Laredo, Tex., nearly every yard has a few trees in it, and the fruit retails at fruit stands for 5 cents apiece, and "very sweet and of the largest size." In Louisiana it is cultivated quite extensively for home use, though usually given away, and rarely sold in the market, except in New Orleans and a few other large places. Little orchards of several dozen trees are here in Florida no uncommon sight; and the new and superior sorts are receiving much attention.

VARIETIES.

Alba plena.—Only ornamental. Flowers double, white.

Caribbean Coral.—"This handsome and attractive sort, recently introduced from the country bordering the Caribbean Sea, bids fair to eclipse anything of the kind ever grown here. Medium to large, yellow, beautifully covered with crimson flush; the skin, while thick, is of a soft leathery texture, classing it among soft-shells, and rendering it a splendid shipper; meat pink and aromatic in flavor; ripens in June." (St. Ceran.)

Early Red.—Recently brought to notice by Mr. R. D. Hoyt, of Bay View, Fla. Very early, ripening in August.

Hermosilla.—Introduced from Hermosillo, Mexico, via California. Described as an excellent variety.

Large Green.—Also introduced to public notice by Mr. R. D. Hoyt; not yet tested elsewhere than at Bay View, Fla.

Legrelliae.—Only ornamental. Flowers reddish-yellow, bordered with white. Double.

James Vick.—Only ornamental.

Nana.—Dwarf. Only planted as an ornamental shrub.

Paper-Shell.—"An extraordinary new variety of very fine quality, with a thin skin, hence the name; the membrane separating the pulp is also very thin, like tissue-paper. For home consumption this variety will be highly valuable; tree a good bearer, but more dwarf than the Spanish Ruby." (Eisen.)

Prolifera.—Only ornamental. A shoot proceeds from the middle of the flower.

Red Saharaupur.—Recently introduced from India. Not yet fruited in Florida.

Rubra plena.—Only ornamental. Flowers double, red.

Spanish Ruby.—"Fruit very large, as large as the largest apple; eye very small; skin thick, pale yellow, with crimson cheek; meat of the most magnificent crimson color, highly aromatic and very sweet. Of all the fruits we ever tasted in our temperate climate the Spanish Ruby pomegranate and the Adriatic fig are the two finest. This pomegranate is simply magnificent, and people who never before did like the pomegranate have praised this fruit as unequaled. The Spanish Ruby is a fine grower and a good bearer; the fruit is a good shipper, and ripens shortly before Christmas-time. It could be laid down in New York during the holidays, and would there attract great attention. This fruit will prove one of our coming export fruits." (Eisen.)

Sour (common).—The most hardy variety. Fruit used in compounding a cooling drink; fruit large and handsome.

Sweet (common).—Fruit pleasantly flavored; commonly grown.

Subacid (common).—One of the kinds in general cultivation.

White Saharaupur.—Recently introduced from India. Not yet fruiting in Florida.

Yellow-flowered.—Ornamental.

There are other ornamental sorts in cultivation, and magnificent Arabian and Indian sorts are described. Mr. Redmond mentioned and described in his essay the following sorts:

Shami.—"Almost stoneless, deliciously perfumed, and as large as an infant's head."

Turki.—"Large, and of a white color."

Caulbul Seedless.—Described as seedless, and as large as a human head.

JUJUBE.

(*Zizyphus*.)*

The Jujubes are thorny shrubs or small trees, much cultivated in China and the East, where many superior varieties are grown, differing in shape, color, and size of the fruit.

The spines are long and straight, and the leaves sometimes furnished with one or two thorny stipules. Jujube trees are hardy in the Gulf States, though very rarely met with. The cold of January, 1886, did not injure large trees in Ouachita Parish, La., in the least. They bear regular and heavy crops of fruit, scarlet, about an inch long, and good taste and flavor. They are used extensively as hedge plants in the south of Europe.

The fruit of *Z. vulgaris* resembles a date, but the tree is of the natural family *Rhamnaceæ*, with simple leaves of the size of apple leaves.

SPECIES PRODUCING THE JUJUBE FRUIT.

Z. Jujuba.—Native of tropical Africa, East Australia, China, and India; in India ascending the Himalayas to 4,500 feet. Cultivated

* Here at Washington some species of this genus live in the open air and bear well. (H. E. VAN DEMAN.)

much in China, and occasionally in the West Indies. Described as an excellent dessert fruit, red or yellow, the size of a cherry. The Tussa silk-worm, the most important of the wild silk-worms of India, feeds on the leaves of this tree.

Z. vulgaris.—The species cultivated in the South, but seldom seen. A native of the East, particularly Syria. Fruits about an inch long, scarlet, and known as “South European jujubes.”

The following species not yet introduced so far as we know :

Z. Joazeiro.—Native of Brazil.

Z. Lotus (the true lotus).—Much cultivated in the countries around the Mediterranean Sea. Used for hedges about Genoa and Nice and in other parts of southern Europe. The fruit is prepared as a dry sweetmeat in Italy. Fruit small.

Z. Mistal.—Native of Argentina.

Z. nummularia.—A closely-related species, from the mountains of India. Fruit of excellent flavor, and shrub often used for hedges.

Z. oxyphylla.—Said to have a very acid fruit.

Z. rugosa.—Native of Nepal and other mountainous parts of India. Said to be very hardy. A small tree.

Z. Sinensis.—A species similar to *Z. rugosa*; a native of Japan and China.

Z. Spina Christi.—Found in middle and north Africa and southwest Asia. Often used for hedges. This shrub is supposed by some to have furnished the crown of thorns placed on the Saviour's head.

KAKI, OR JAPAN PERSIMMON.

(*Diospyros kaki*.)

The Japan persimmon, though it can not strictly be classed with semi tropical fruits,* is more at home in the Gulf States than elsewhere in the United States. It has taken its place with the standard fruits of the South, and is a favorite with many. It is never affected by cold in the lower southern States, and is one of the most handsome of fruit trees. It can be worked on either imported or native stocks; and budded or grafted. The imported stocks are not so much in favor as the native persimmon (*Diospyros Virginiana*). The native tree is more vigorous, and makes a larger tree. Root-grafting, top-grafting, and budding are all practiced in working the persimmon, and each method has its advocates. Trees seem to be equally healthy worked in either way.

The fruit ripens from August to November, and retails throughout the South, according to locality and variety, at from 10 to 75 cents per dozen, sometimes higher.

Mr. P. J. Berckmans, the well-known pomologist of Augusta, Ga., says of the Japan persimmon in his valuable catalogue :

The merits of this fruit are the early bearing age of the trees as well as wonderful fertility, as it is quite common to see one-year-old trees planted in spring produce a

*Owing to the fact that it is fully as tender as the fig, I think it properly semi-tropical. (H. E. VAN DEMAN.)

crop of from twenty to fifty well-developed persimmons the following year. The tendency to overbearing should be checked by removing the largest proportion of its fruit when fully set, in April or May, and leaving only a number commensurate with the age and size of the tree. The fruit of most varieties is of a bright orange red or light vermilion color, in shape and general appearance resembling a large smooth tomato, and begins to color when half grown, but should be allowed to hang on the tree until just before a frost is expected or, in the case of the early ripening varieties, when fully soft. If gathered before a frost there is a slight astringency next to the skin in most varieties, but this disappears after being kept in the house a few days or weeks. If allowed to be slightly touched by frost the flavor is much improved, but the fruit will then not keep many days. It is therefore desirable to gather the fruit before frost, if intended for keeping, and then some varieties will remain sound until January or February. The flesh is soft, rich, and sweet, and has a slight apricot flavor.

There are many varieties of the persimmon raised in Japan; some are eaten in a fresh state, others are used for drying. Samples of dried persimmons have been sent from Japan, and they are equal to the best Smyrna figs, but with a peculiar and pleasant aroma.

We have endeavored to arrive at a correct nomenclature, but after seven years in fruiting the persimmon we are as much puzzled now as at the start. Large quantities of the trees are annually imported from Japan; the varieties seldom exceed twelve in the collections usually sent to this country, yet when the trees bear fruit the same name is often found to apply to several distinct varieties, or one variety has several names."

The only insect enemy of the persimmon that we have thought formidable is the twig-girdler (*Oucideras cingulatus*, Say). The best way to eradicate this insect is to burn all branches and twigs that have been girdled by it, as the eggs of the next year's generation are contained in these twigs. A notice and description of this insect and its habits may be found in the report of the entomologist for the year 1871, page 72, of the Report of the United States Department of Agriculture, and probably in other later reports. In some localities the destruction wrought by this beetle has been so great as to deter parties from planting the persimmon to any extent.

The ultimate market value of the Japan persimmon is yet uncertain, but it is probable that in time it will be found to pay the best if dried or evaporated, and marketed in the manner that dates, figs, and raisins are disposed of. We are not aware that any attempts have yet been made to market the persimmon in this manner in the United States.

VARIETIES.*

There is so much confusion existing as to the names of the varieties that a list and descriptions are not given.

In addition to the fruits already described, there are many varieties of native and imported plums, cherries, peaches (especially of the Chinese strain), quinces, apples, grapes, pears, blackberries, strawberries, mulberries, and even raspberries, that are eminently adapted to

* The reader is referred to my remarks and descriptions beginning on page 6 of this report. (H. E. VANDEMAN.)

culture in the South, and apricots, nectarines, almonds, chestnuts, pecans, Caucasian and Chinese walnuts (often improperly called English), filberts, European medlars, *Pyrus Mauleii*, and other fruits are grown with varying degrees of success in different localities, but as these are fruits of the warm temperate zone, their discussion does not come within the limits of this report.

Very respectfully,

P. W. REASONER.

MANATEE, FLA., *September 10, 1887.*

Hon. NORMAN J. COLMAN,
Commissioner of Agriculture.

TROPICAL AND SEMI-TROPICAL FRUITS OF CALIFORNIA, ARIZONA, AND NEW MEXICO.

BERKELEY, CAL., October 15, 1887.

DEAR SIR: I hereby submit a report on the condition of tropical and semi-tropical fruits of California, Arizona, and New Mexico.

Yours, most respectfully,

W. G. KLEE.

Hon. NORMAN J. COLMAN,
Commissioner of Agriculture.

CITRUS FRUITS, ORANGE, LEMON, LIME, ETC.

THE ORANGE.

The orange (*Citrus aurantium*) is doubtless the hardiest of the edible members of the Citrus family. The lowest temperature the orange tree will endure, without suffering any serious injury, depends somewhat upon the condition of the growth of a tree. Under favorable circumstances, when comparatively dormant, it may escape serious injury even when exposed to as low a temperature as 21° F. The stock chosen to graft upon undoubtedly governs the hardiness, and we are led to believe from personal observation that the Japanese Mandarin orange, when grafted on the deciduous species (*Limonium trifoliata*) will easily endure this temperature, and perhaps even lower. While, however, the tree may escape unharmed, it must be remembered that the fruit will not endure such a low degree, and should a temperature of 26° prevail for many hours, it would be utterly worthless.

The planting of the orange in the northern and central part of the State, as a commercial enterprise, does not date back many years, and even in those counties that claim to be well adapted for orange-growing the plantations are comparatively scant and must still be regarded in the experimental stage. Enough data, however, are at hand to show that with judicious selection of sites, especially in the so-called thermal belt, orange-growing can be made a success. These thermal belts are found skirting our coast valleys, and also the larger valleys at a slight elevation from a hundred to a thousand feet or more, depending upon

the configuration of the mountains. There are instances of orange trees having produced fruit in a latitude even as high as Shasta County. There are several trees successfully growing there, one of them in its thirteenth year, and producing this season over 500 oranges. The soil in which this tree is growing is extremely shallow.

CENTRAL AND NORTHERN COAST REGION OF CALIFORNIA.

Scattered in the gardens of the city of Oakland we find some orange trees, planted chiefly for ornament, but the climate being comparatively cool, the fruit produced is inferior and late in ripening. In the town of Alameda several trees are on record as having produced fair fruit.

In the foot-hills skirting San Francisco Bay, sheltered warm nooks will produce oranges of fair quality.

In San Mateo County we have seen both seedling and budded oranges, an example of the latter being a tree three years old, producing well-flavored oranges.

In Santa Clara County we find trees producing fair fruit, but no serious attention has yet been given to the matter. In the foot-hills on the west side of the valley, especially in the vicinity of Los Gatos, a number of trees are growing. Mr. C. H. Wilcox's orchard deserves special mention, as it proves what can be done in this region.

Mr. Wilcox has kindly furnished me with the following information:

The oldest orange trees on the Jesuit fathers' place here have been planted six years; they have been budded and cut back this summer. A few budded trees set five years ago commenced to fruit the second year after being planted (some of the seedlings the fourth year; they were bought for three to five years old). The first planted trees are from 10 to 16 inches in circumference. Except on a few rocky points none of the trees have ever been irrigated, nor have they ever been protected from frost. I have raised seedling oranges in the open air nearly every year, and never had one frozen. I consider what I bought for Kenah the best, having very thin skin and being very juicy, hanging on the tree till the present month (September). The next best I consider St. Michaels, and the two varieties of Navels. The Mediterranean Sweets are generally poor, except some few trees in dry places. Wherever the land is rich the fruit is coarse. I prefer the oranges from irrigated trees.

The place referred to by Mr. Wilcox was formerly owned by him, and is located about 100 feet above the town of Los Gatos, on rolling land. The soil is a deep red gravelly loam, on which all kinds of deciduous trees flourish. The orchard was visited by the writer two years ago, and was then in fine order, the trees showing sign of but little black-scale. We have referred particularly to this orchard, as it is the largest one in the section where growing oranges without watering has been attempted.

In Sonoma Valley, there is to be found a number of small groves of orange trees producing good and merchantable fruit. Of these, the oldest belongs to General Vallejo; from another, of Mr. N. Carrigen, a crop is regularly obtained and marketed. Both these orchards are on sloping ground near the hills. About Healdsburg and Cloverdale, in Napa

Valley, and in the hills bordering the valley, oranges in many sheltered nooks have done well.

The following information comes from Mr. George Beach, of Saint Helena :

My oldest orange trees are thirteen years old, in bearing four to five years. I have several eleven years old, in bearing two to three years. The fruit is large, juicy, but with thick rind. These are all seedlings, but bear heavy crops. We begin to pick them in the middle of December, but they are best in February until the first of May, when they lose rapidly in quality. Besides these older trees I have a number of younger trees of budded varieties of all ages.

The writer saw a number of orange trees about Saint Helena, but Mr. Beach's are amongst the best cared for. The trees are all irrigated. Some soft orange-scab is found, but the trees are pretty bright.

The character of the oranges grown in the coast region within the reach of frequent fog partakes naturally of that of the coast region of the southern counties.

When not especially cared for the trees are affected by scale, and a subsequent fungus gives both fruit and foliage a smutty appearance. When scale is not present, no difference is noticeable between the coast and interior fruit, except the former may be of a somewhat paler color. As we proceed inland away from the fogs the black-scale becomes less and less noticeable, and finally, where fogs are not prevalent, it disappears altogether.

SOIL.

The soil considered to be best adapted to the successful growth of the orange is principally a sandy loam, because such a soil is less subject to being baked by repeated irrigation and cultivation. But there can be seen well-grown orange trees in various parts of the State on a great variety of soils, including the black heavy soil known by the name of black adobe, but the latter must be considered unfavorable on account of the difficulty in irrigating it.

IRRIGATION.

This is, with the exception of a few cases, practiced generally, and must be considered necessary to bearing trees; the amount necessary must naturally vary according to rain-fall of the section as well as of the soil.

VARIETIES.

The best authorities on orange culture in southern California agree pretty well that there are four varieties which are likely to be the leading ones for some time; of these the *Washington Navel* is generally placed first, and is well described and figured in the last Report of the U. S. Department of Agriculture. It is one of the earliest to ripen here.

Mediterranean Sweet.—Imported by chance from England by Elwanger & Barry, of Rochester, N. Y., as a shaddock, but proving a good orange instead, was propagated by A. T. Garey, of Los Angeles; is of

oval shape, rather thick-skinned, sweet, pale-colored, ripens late; almost thornless.

Maltese Blood.—Introduced from abroad, a round smooth fruit, a little undersized, when fully ripe only developing the characteristic color of pulp; has brought nearly the same price in market as the Navel; is a very juicy but rather acid orange.

Paper-rind Saint Michael.—A small very thin-skinned orange of fair quality, pale-colored.

Valentia Late.—A variety which keeps till June in good condition, hence has proved valuable when raised in limited quantities.

Mandarin and Tangierine.—These two Japanese or Chinese varieties are grown to some extent on account of their early ripening; and prove profitable. Mr. A. P. Chapman, of San Gabriel, who has one of the largest groves of the latter variety, considers it his best-paying orange. To the Japanese family the "*King*" of Cochin-China belongs; it has fruited, and is being propagated by the firm of Twogood & Cutter, of Riverside. It is an exceedingly juicy and pleasant orange, with a rough skin, ripening late. Tree very thorny.

There are, besides the few varieties named, quite a number cultivated, but the general verdict seems to be that none of them have proved sufficiently profitable to justify their propagation by budding, and when the first-named varieties are not used, seedlings from Tahiti seed are grown and allowed to bear. The seedlings are generally very vigorous growers, but require ten to twelve years to reach good bearing age, while budded varieties reach this in half the time. The budded varieties all more or less show a tendency to overbear, hence the trees become half dwarf. This tendency can be counteracted by budding on large six or seven year old seedlings, inserting the buds in the limbs. This fact has been demonstrated clearly by Mr. Cutter, of Riverside, in case of the Washington Navel.

PRUNING.

Want of space does not permit entering into any discussion of the details of pruning. There are two chief systems practiced—low and high pruning. The first has its strong advocates, claiming that a much larger quantity of fruit is produced earlier. We think there is much in favor of this argument. On the other hand, the objection of more difficult cultivation is raised, but this can be remedied by differently-constructed implements. The high pruning allows about 4 feet of a trunk, while the low gives hardly any.

GRAFTING STOCK.

There are growing in the State orange trees on at least five kinds of stock—China lemon, common lemon, sweet orange, sour orange, and three-leaved orange (*Limonium trifoliata*). The China lemon was in the beginning propagated much because it grew from cuttings; it is now

entirely condemned, the trees having proved short lived and subject to gum disease. Lemon is subject to the latter objection, although in a much less degree. The sweet orange is raised from seeds from the Pacific islands and is the stock most tried, and on it are all the finest orchards. The late scarcity of stock has led to the importation of sour-orange stock from Florida, and the stock wherever tried seems well adapted to the climate and soil, being very vigorous and healthy. Lately the Japanese oranges are being introduced and planted; the stock in this case is the shrub *Limonium trifoliata*, a deciduous species with three-lobed leaves. It is essentially a dwarf stock and quite hardy.

CENTRAL AND NORTHERN INTERIOR.

We have referred to the orange trees grown in Shasta County. This is in all likelihood the most northern county in the State in which oranges may be successfully grown, and locations adapted are therefore necessarily restricted.

During the last Citrus fair, Tehama County showed oranges which compared very favorably with others grown in adjoining counties.

At Bidwell's Bar, the former capital of Butte County, is found an orange tree which was planted in 1859, and although having been left to itself, it is still doing well. The soil is naturally rich. The tree is about 25 feet high, about 16 inches in diameter of trunk, and is said to have produced in a single season 3,000 oranges. This is probably the highest elevation at which orange-growing in Butte County has been attempted.

In the town of Oroville is to be found a number of large orange trees, some of them over 25 feet high, and this in spite of having been planted altogether too closely. They receive plenty of water and develop rapidly. Nearly all the older trees are seedlings. But lately a number of young trees, all of budded varieties, have been planted. Across the Feather River, on the table-land, about 80 or 100 feet above the river, the Oroville Citrus colony has undertaken the planting of large orchards. The soil is red, gravelly, of varying depth, in places quite shallow. The forty acres planted two years ago are doing remarkably well. They are mostly of the Washington Navel variety. No older trees exist in the colony, but on a knoll on which the county infirmary stands there are over 20 nine-year old trees, all seedlings. The largest of these is about 20 feet high, with a crown diameter of about 15 feet. The trees are loaded with fruit, and show no signs of ever having been injured by frost. Altogether about 200 trees are found here, varying in age from nine years to two. They receive plentiful irrigation. In other parts of Butte County orange trees are met with, *e. g.*, at Chico and at Biggs, but have been regarded more as ornamental trees.

YUBA COUNTY.

In nearly all the gardens of any size in the town of Marysville, as well as the adjoining town of Yuba City, in Sutter County, one may meet with

oranges and lemons. The soil here is sedimentary, and the oranges when well cared for develop rapidly. A lady of Marysville received the medal for the best exhibit of citrus fruits at the Sacramento fair in 1886.

PLACER COUNTY.

On the rolling hills of Placer County, at an elevation of 500 to 1,200 feet, there is scattered a number of small orchards of orange trees. In many instances these trees are small and stunted, having been allowed to overbear, but when well cared for even in shallow soil, the trees attain good size, the fruit large and handsome. At Newcastle, Silva & Son and Dr. Frey have grown a number of different varieties of oranges, as Australian Navel, Mediterranean Sweet, etc., all doing well. Near Penryn several places have trees eight to ten years old. At Auburn, at a considerable elevation, orange trees are growing well. The selection of the proper site, free from killing frosts and abundantly supplied with water, are here necessary to make the tree a success.

YOLO AND SACRAMENTO COUNTIES.

Both of these counties are comparatively level and must be considered as furnishing less favorable sites for orange-growing than the foot-hills, but it remains nevertheless a fact that at Sacramento a large number of orange as well as lemon trees are found in the gardens fruiting freely. At Woodland also a number of trees have fruited for several years past.

STANISLAUS COUNTY.

At Knight's Ferry a fine orange orchard is growing. For a number of years it has produced fruit, samples of which, shown at the San José fair in February last, attracted general attention.

The interior counties of the southern San Joaquin have not been sufficiently developed to prove their adaptation to orange culture, but enough has been learned to conclude that there exist favorable sections along the foot-hills of Fresno, Merced, Tulare, and Kern Counties where with proper irrigation oranges might be a success. From Porterville, Tulare County, oranges were exhibited in San Francisco two years ago which compared favorably with those grown in any part of the State.

SOLANO COUNTY.

The interior of Solano County, in the upper part of Pleasant Valley, and also on Putah Creek near Winters, are small plantings of oranges. Among these that of John R. Wolfskill produces quite early fruit, which has been marketed in December.

SOUTHERN COAST REGION.

Oranges are produced in San Luis Obispo County, but as far as we have learned not in sufficient quantities to appear in market.

The five counties which alone so far have figured as orange producing counties are Santa Barbara, Los Angeles, San Bernardino, San Diego, and Ventura.

Santa Barbara has a number of trees scattered over the town. These, in common with all other citrus fruits near the coast, are very black with the scale. North of the town, on the Hollister estate, an orchard of 20 acres is to be found. At present it is suffering severely from attacks of *Icerya purchasi*. South of Santa Barbara, at Montecito, are a number of orchards, many of them showing great lack of attention. A striking contrast among these is the orchard of Mr. Johnston, who by attention has proved that oranges pay there. The soil is a sandy loam.

At Santa Paula, Ventura County, Mr. N. Blanchard has a thrifty twelve-year old orange orchard, mostly seedlings. The soil is a deep sandy loam. Irrigation is practiced to some extent. About the town of Ventura are scattered orange and lemon trees. In the interior of the county, at the Comulas ranch, are some of the oldest trees in the State. For many years these have produced fruit reputed to be very fine.

Los Angeles County has from the beginning maintained the supremacy in regard to the yield of oranges, and while the prodigious growth of towns and cities is making heavy inroads in the groves, so many trees are being set out every year that the equilibrium is still maintained. In the immediate vicinity of Los Angeles the orchards are rapidly disappearing, the famous old Wolfskill orchard having been cut up recently. As the spread of various scale insects has made sad havoc with many of the orchards, the rapid settling of the land for town purposes may be considered fortunate for the individuals who sell out, but the total abandonment of many orchards to the ravages of insects is necessarily fraught with danger to other orchards in the country.

Pasadena, now considered a suburb of Los Angeles, was originally planted out to orange trees chiefly, but now it is following the fate of Los Angeles, by being converted into town lots.

Farther out, in San Gabriel Valley, a number of large orange orchards exist, although many of them are sadly neglected. One of the best kept and consequently best paying orchards is that belonging to Mr. A. B. Chapman. The soil in which the orchard stands is of a very sandy nature, in many instances the substratum being pure sand only 2 feet below, yet by judicious irrigation and fertilization this orchard compares favorably with any other in the county. The mode of fertilization is by floating manure in the water sent over the place in small ditches, and from there passed into square basins surrounding the individual trees. The walls of these basins are made by throwing up the earth in a ridge a foot high.

It is generally agreed by all persons engaged in orange-growing that slightly-elevated mesa lands are better adapted to the growth of the orange, which here invariably is of a much brighter hue, owing chiefly

to absence of scale. A number of thriving settlements vie with each other, proclaiming superior advantages. Of the older settlements, Pomona shows many fine orchards. The tendency everywhere seems to be to replant the seedling with superior varieties, especially the Washington Navel.

The Santa Ana Valley contains still a large number of fine orchards, but many are suffering very severely from the attacks of the red-scale (*Aspidiotus aurantii*), which is playing sad havoc with lemons; also, growers are somewhat discouraged, but the more determined are preparing to protect themselves in various ways.

The soil is variable, but about Tustin and Orange is a deep, rich, sandy loam. The number of orange trees reported by the assessor was about 800,000.

SAN BERNARDINO COUNTY.

The brighter appearance of the fruit produced on the high mesas of Los Angeles County is still more pronounced in the mesas of San Bernardino, and from the fact that the largest sections growing handsome oranges being at Riverside, has led to the market quotation "Bright Riversides." This brightness of fruit and leaf is chiefly due to the absence of the black-scale, and lends a great charm to the well-kept orchards of this county.*

The first orchards were planted there in 1872. In the year of 1885 there were estimated to be 193,000 trees of various ages, and the yield in 1885 amounted to about 500 car-loads, which sold probably for about \$360,000. These figures are furnished by Mr. L. M. Holt. For the area all in oranges no portion of the State presents as fine a showing. This is undoubtedly due to the fact, aside from the climatic conditions, that orchards are chiefly small holdings, and that the owners have attended in a large measure to details themselves, and have been especially watchful in regard to injurious insects. The soil at Riverside varies from a sandy loam to a reddish clay loam. Irrigation is practiced, and the best cultivators use about one-third inch per acre.

The trees are generally trained high, giving trunks of 4 feet; no weeds are allowed to grow in the orchard; the cultivation following in a day or so after each irrigation.

With the exception of occasional freezes, which in some years have affected the crop in portions of the Riverside district, orange-growing has proved exceptionally profitable. The success attained there led other portions of the country to engage in orange planting, and on the mesa lands, on the opposite side of the valley, large young orchards are now coming into bearing. In the district of Lugonia, Redlands, and Colton Terrace, some very fine orchards are growing, which have produced very superior-looking fruit. According to the *San Ber-*

* I wish to add my emphatic indorsement of this statement. It has never been my pleasure to elsewhere see so fine looking orange orchards or so handsome fruit as at Riverside. (H. E. VAN DEMAN.)

nardino Citrograph there are growing in San Bernardino Valley about 50,000 trees. To this must be added the colonies of Etiwanda and Ontario with perhaps 700 acres of citrus trees, or about 70,000 trees.

SAN DIEGO COUNTY.

In the immediate neighborhood of San Diego and National City exist a number of small orchards which have produced some very superior-flavored fruit; their color has been naturally affected by the presence of the black-scale, but which, owing to a limited supply of water, have not been in the most flourishing condition. With a better water supply this is already changing. But here, as everywhere else, the superiority of the mesa lands is rapidly being recognized. One of the best and largest orange orchards is that of W. W. Whitney, at Highlands, some 5 miles back of the bay. In portions of the interior valleys of El Cajon and Poway the orange does well. In the somewhat elevated valley of San Jacinto the writer saw some few fine orange trees, and understands that the upper portion is being planted to this fruit.

ARIZONA.

The data on orange-growing from the western section is confined wholly to the town of Yuma, on the Colorado River. Young orange trees have been planted in many of the yards during the last year and are doing comparatively well, but few have attained age enough to bear. At the Southern Pacific Hotel there are several trees 15 feet high, which were transplanted three to four years ago from the old barrack grounds; they are fruiting some now. Mr. John Gandolpho, a very intelligent Italian merchant in town, has a tree five years planted which has been fruiting two years, and, as he informed me, ripens in December. Soil a sandy loam.

From central Arizona Mr. Lincoln Fowler, of Phoenix, reports that several trees are growing in the Salt River Valley which are now full of fruit, and that they are turning yellow now (October), indicating that they will ripen in December. As might be expected from the dryness of the climate, no black-scale seems to be able to live; all trees of all kinds, even the oleander, which is nearly always affected, being perfectly free. Some attempts have been made on bottom-lands to grow the orange, but the frost has in one instance killed a young orchard to the ground; this, however, consisted of only one-year-old trees and unprotected. Doubtless the mesas are the only safe places for citrus culture, being much less affected by frosts than the lower land. The lowest record of the thermometer for eleven years at Yuma is 22½° F.

THE LEMON.

The lemon (*Citrus limonum*) is less hardy than the orange, and although it may seem strange, experience has proven that it is better adapted to the cooler climate of that part of the coast region where frost does not

prevail. This is for two reasons: First, its chief value is its acid, and it does not require as much heat to develop this quality as the orange requires; second, it matures fruit nearly all the year round, and is therefore more valuable than where it ripens all, or nearly all, its fruit at one time. There is only one objection to selecting the moist climate of the coast, the same as that against olive culture in that region, viz, the great liability to black-scale, and, in consequence, the smutty appearance of the fruit; but as the lemon is a smaller tree, and the scale easily killed by washing, the objection is not very serious.

SOIL.

A well-drained sandy loam is unquestionably the best for the lemon, especially when on its own root is this necessary. On orange stock it is much more hardy. Good results are obtained on extremely sandy soil by manuring and plentiful irrigation.

IRRIGATION.

The rain-fall in that part of the State devoted to lemon culture being rather scant, considerable irrigation is practiced, the amount varying according to the soil and location.

The lemon is generally propagated by budding, the stocks being different. The orange seedling is generally conceded best. The Chinese lemon, which readily grows from cuttings, was formerly considered the best, but it is being discarded, as it is subject to gum disease. The lemon itself may be propagated from cuttings, which form very good trees, but it is generally maintained that such can not attain the age that seedling trees can reach, and experience proves this to be true.

In pruning, the lemon is generally not cut more than is necessary to give it shape, which consists in heading back the tree for several years in succession about one-half of its growth, also thinning out the shoots, so as to prevent too dense a growth. This latter is also necessary after the tree has reached the bearing age.

TIME OF BEARING.

A lemon tree, on two-year-old root, begins to bear in three or four years. Many prefer to allow the orange trees intended for stock to become large and strong (five or six years old) before budding. In such a case only two years are required before the lemons come into good bearing, and a box of lemons can be counted on for the third year. Under favorable circumstances it is reasonable to expect an increase of a box a year until the trees have attained full-bearing size, when they will yield from three boxes upward.

CURING.

To become a perfect lemon the fruit must be picked at a certain stage, which time varies a little according to the variety. Generally it is fit to pick when it shows the faintest signs of turning yellow. Such

varieties, as the Eureka, are picked when quite green, and will still mature. When picked, the lemons should be assorted to ripeness and size, placed in boxes and set in a cool airy place, where they remain for three or four weeks, when they are ready for permanent packing and shipment.

VARIETIES.

The chief varieties cultivated in Los Angeles are the Lisbon, Eureka, and Genoa. The Lisbon is by many growers considered the best, having a very pretty shape. The tree has small thorns. The Eureka is a thornless variety; the type of the fruit is somewhat longer than most varieties; it has very few seeds, and is an excellent bearer. The Genoa is also an excellent thornless variety. Several seedlings have originated in the State. One was first propagated by Dr. E. Kimball, of Haywards, known as the Alameda Seedling, under which name we find it at Pomona. The Bonnie Brae originated with Mr. H. M. Higgins, of San Diego, and is one of the handsomest lemons existing, but does not seem to have met the expectations of the originator; one of the objections seems to be a tendency to crack open.

NORTHERN CALIFORNIA—INTERIOR.

The lemon, being less hardy than the orange, is not found as abundantly in the northern part of the State; still it is found in a good many counties where the orange has been tried. In Placer County, near Newcastle, we have seen several trees. At Oroville, in Butte County, we find them in the gardens mingled with orange trees. In Marysville, Yuba County, the lemon tree is seen in many gardens. In Sacramento a large number of trees may be seen bearing well. In Solano County, in Pleasant Valley, or rather on the rolling hills about the valley proper, also in the adjoining Vaca Valley, lemons are found.

NORTH CENTRAL COAST REGION.

In Napa Valley, as high as Calistoga, we find lemons. Near Saint Helena Mr. George Beach has several young trees, which have grown without protection for two years. In a number of gardens other lemon trees are found. In Sonoma, Santa Clara, and Contra Costa counties lemon trees are found scattered all over, but are planted only in protected nooks, especially in the thermal hills of these valleys. In Alameda County, at the Old Mission, San José, and at Niles, on the Shinn place, are lemon trees. At Haywards Dr. Kimball has quite a number of trees which are proving profitable. In fact, it seems that where sufficient shelter is given from the strong trade winds the lemon will do well around the Bay of San Francisco, especially if planted in a sandy loam.

SOUTH CENTRAL CALIFORNIA.

In the southern part of the San Joaquin Valley, to our knowledge at least, few lemon trees exist.

SOUTHERN CALIFORNIA.

The lemon is well adapted to Santa Barbara County, and flourishes there everywhere, even on the sandiest land, provided they receive water enough. The black-scale of course troubles it, but it bears abundantly in spite of the insect. Several large orchards exist, which before the advent of the cottony-cushion scale were quite profitable.

Ventura County has much land well adapted to the lemon, but not yet extensively cultivated for that purpose. At Santa Paula, 14 miles from the sea, it does exceedingly well, and is found in most gardens. Mr. N. Blanchard has here a fine and profitable orchard of the most valuable varieties of lemons. The soil is a deep sandy loam, and deciduous trees are not generally irrigated, but it is thought necessary to irrigate the lemon at least two or three times a year.

LOS ANGELES COUNTY.

The coast climate of this county is well adapted to the lemon, still there are not many large orchards. Most of the gardens have lemon trees planted. In San Gabriel Valley are several lemon orchards, and from there some really fine lemons were sent. The most extensive orchard is that of A. B. Chapman. The Genoa, Lisbon, and Eureka are the varieties most grown here. The soil is of a very sandy nature, and plentiful irrigation and manuring are resorted to. The trees under this treatment are vigorous and have a deep-green tint, which is the best sign of a healthy lemon tree.

POMONA.

In this colony are a number of fine young orchards coming into bearing. In Santa Ana Valley Mr. H. K. Snow has one of the largest plantations.

The number of lemon trees growing in Los Angeles County, according to the report of the assessor in 1886, is 55,620, the largest number in any county. In the southwest part of the county, about Orange, the lemon is cultivated to some extent and does exceedingly well. Irrigation is here practiced freely.

SAN BERNARDINO COUNTY.

At Riverside the lemon was formerly planted more extensively, but part of the land devoted to it being subject to slight frosts, it is cultivated with success only on the gentle slopes above the valley.* The total absence of the black-scale accounts for the brightness of the color of the lemons produced there; this peculiarity alone commanding a better price for the fruit. Other parts of San Bernardino produce some lemons, but the prevailing citrus culture is of the orange. The number of lemon trees growing in Riverside is estimated by Mr. L. M. Holt at 18,000. The *Citrograph* reports only 700 for east San Bernardino. Ontario claims quite an area.

*By far the best lemon orchards noticed by me in the State were at Riverside, being less injured by frost and better loaded with fruit. San Diego County is equally good for lemon culture. (H. E. VAN DEMAN.)

SAN DIEGO.

Until late years the lack of water available for irrigation in this county has been a drawback in lemon culture, and it is only within the last few years that the lemon orchards have been properly attended. That this county is as well if not better adapted to lemon culture than are adjoining counties there is sufficient proof. Several valuable seedlings have originated here. The black-scale is troublesome immediately on the coast, but in the higher lands, away from the sea, it is very easily managed.

ARIZONA.

The only record of lemons bearing in this Territory is from the town of Yuma, where there are a good many young trees bearing a little, few of them being more than four years planted. Mr. J. Gandolpho has a tree planted five years, now about 15 feet high, which last year produced about two boxes of fruit. It is fruiting sparingly this season. The soil is a sandy loam, and surface irrigated.

Mr. L. Fowler, from Phoenix, reports that there are a few trees growing in the Salt River Valley, but too young to bear yet.

THE LIME.

(*Citrus limetta.*)

The lime being much more tender than either lemon or orange, naturally has a more restricted range in California than either of those fruits.

NORTHERN AND CENTRAL CALIFORNIA.

Although there are instances on hand in several places in this part of the State of limes bearing, their liability to being frost-bitten severely at times must exclude their cultivation for all practical purposes, except in some little sheltered nooks.

SOUTHERN CALIFORNIA.

At Santa Barbara, Monticeto, and Carpenteria the lime is seen in many gardens, and in the more sheltered places does well, bearing profusely, being here, as are other citrus fruits, subject to black-scale, and is rendered unsightly if not treated specially. At Santa Paula, Ventura County, the lime does well, being planted, as in Santa Barbara, chiefly as a hedge. In Los Angeles County the lime has been used in the same manner as in the previously-mentioned counties, but owing both to the ravages of insects and uncertainty of crops from occasional frosts it is rapidly being abandoned. One of the few remaining lime plantations is found on the Sierra Madre villa, San Gabriel Valley. The locality is remarkably frost-free.

About the Bay of San Diego the lime flourishes well, if planted on good soil and is well irrigated.

In San Bernardino County but few lime trees exist. At Riverside they have been abandoned as being too tender.

ARIZONA.

The lime can be seen in several of the gardens in Yuma, where with sufficient care it does well. The largest tree is in the yard of Mr. Gandolpho, having been planted five years. The tree is now 12 to 15 feet high, and has been for two years past producing a few large limes. The tree is pretty well loaded now (October 1), and the fruit is ripening fast.

OTHER CITRUS FRUITS.

Beside the orange, lemon, and lime, the citron is met with, having ripened even at Sacramento, but its culture has never been undertaken upon a commercial scale. The shaddock, likewise, can only be considered a curiosity, sometimes cultivated for its large flowers. The variety called Grape-fruit* has recently been introduced from Florida. The sweet lime† (the Mexican *Lima dulcis*) has fruited in Santa Barbara, but will probably always remain as a curiosity, being quite tender.

TROPICAL FRUITS.

GUAVA.

The guava is an evergreen shrub belonging to the Myrtacæ. The only two species which have come to my notice as being cultivated for profit are the Strawberry guava (*Psidium catleyanum*), and the Yellow (*Psidium pyrifera*), also called the Pear guava. The Strawberry guava, a native of China, is a shrub with roundish, dark-green, leathery leaves, quite ornamental; flowers small and inconspicuous. This tree blooms during the summer, and the fruit begins to ripen in October, and in southern California lasts for several months. The fruit varies in size from that of a cherry to a small plum, is dark red outside, with flesh-colored pulp, juicy and refreshing, reminding one of the strawberry with a little of the myrtle flavor. It is cultivated on a small scale in southern California, and has fruited even in Berkeley and Sacramento. But the largest specimens of trees we have seen are growing in Cholla Valley, near San Diego, these being probably 12 to 15 feet high. In the Los Angeles market are to be seen guavas ripe and for sale at good prices, because they come at times when other fruit is scarce. This fruit may be eaten uncooked with cream, and is good in preserved form.

A sandy loam seems best adapted to the growth of the plant, but it can be grown on other soils also. The guava will endure slight frosts, and bear fruit in most localities, but it is well to protect it the first year.

* This should properly be called *Pomelo*, and may be said to be an edible variety of the shaddock family, and by some botanists is named *Citrus pomelanus*. (H. E. VAN DEMAN.)

† This fruit is practically valueless, being insipid and to most tastes nauseating. (H. E. VAN DEMAN.)

In a moderately moist soil, with a rain-fall of about 20 inches, it will do well without irrigation, but in a sandy soil it requires irrigation the first year. It is propagated readily from seed, also from cuttings under glass.

Psidium pyrifera (Pear-shaped guava) is also a bush with large pale-green leaves, fruit large, pear-shaped, yellow. So far here, it has grown only to small size even in sheltered localities, being, as it seems, far more tender than the Strawberry variety. Probably in some of the almost frost-free sections of California it might be grown successfully. So far, we have not learned of its having ripened fruit except at Santa Barbara, and here fine jelly has been prepared from it.

ANONA CHERIMOYA, OR CUSTARD-APPLE.

There exist in South America a number of species of *Anona*. The only one so far tried with success in California is the Cherimoya. This species is a small tree, with dark handsome leaves. It is quite tender, and its culture, if attended with profit at all, must be confined to the warmer coast sections of Santa Barbara, Los Angeles, and San Diego Counties. The tree has been grown in but few localities as yet. In Berkeley it succumbed at 28° F., and it is probable that it will not endure long even at 30° F. Trees distributed from the Experimental Gardens of the University of California, are grown in the thermal belt of the San Gabriel Valley. At San Diego, Los Angeles, and Santa Barbara it may be seen in gardens. The greenish-white flowers exhale a delightful odor, similar to that of a freshly-cut musk-melon. At Goleta, Santa Barbara County, Mr. J. Sexton succeeded for several years in bringing to perfection fruit, specimens of which weighing 1 pound were sent to Mr. E. J. Wickson, who pronounced them excellent.

BANANA. ✕

The banana has been planted in a number of counties in this State even as far north as San Mateo. The Abyssinian banana grew to the height of 30 feet, and produced seed from which plants may now be seen growing in many parts of the State. As is well-known, this species has a fruit that is of little value, and the plants have always been regarded as the hardiest of the family. The common banana (*Musa rosea*) has been planted in many places in southern California, and in very frost-free localities it matures fruit of very fair quality. Thus, for instance, we ate in September, 1886, bananas grown in Tustin, Los Angeles County. It will do well in localities where the Cherimoya succeeds, but considering that we receive the fruit in abundance from Mexico and the South Sea islands, its profitable cultivation here is exceedingly doubtful.

ARIZONA.

In the gardens of Yuma the banana can be seen, and it is fruiting in various places, but the leaves suffer much from the strong winds,

and need protection. As much as half an acre of plantains were at one time planted, which fruited, but were finally abandoned, chiefly on account of lack of water. In the Salt River Valley, the banana is fruiting for the first time this year.

DATE PALM. (*Phoenix dactylifera*.)

In a report to the U. S. Department of Agriculture in 1883 the writer recorded all the available facts in regard to date culture, and translated extracts from the monograph on the date by Prof. Theobald Fisher, of Prussia. To this, those interested in this remarkable tree are referred.

Since my more thorough acquaintance with the climate of our State, I have not had occasion to change my expressed opinion of five years ago, that in California and Arizona we have a climate well suited to the production of the date.

The peculiar climate here, marked by long rainless summer, and winters scarcely to be called winter, is strikingly similar to that of the Orient, where the date flourishes. The reason of our not having demonstrated practically the culture of the date is, I think, due chiefly to the fact that in no one locality have there been fully combined the three most important conditions for successful date culture, viz: requisite amount of heat, water, and proper care in fertilization of the fruit.

CENTRAL CALIFORNIA.

At the ranch of J. R. Wolfskill, on Putah Creek, the case of a seedling date-palm ripening fruit was recorded in my report in 1882. The tree has continued to increase in size, and when the writer visited it this season it was found to be full of large bunches of well-developed fruit. Last year the fruit ripened in November, but this year it promises to be earlier.

In Fresno County date trees growing on the grounds of the Eisen vineyard, and also on that of J. C. White, bloomed for the first time this year. Those on the Eisen vineyard did not set; the result of those belonging to Mr. White I have not learned. At the Hollister estate, of the palms mentioned in my report of 1884 several have fruited, but the fruit, as might be expected, owing to the cool locality, ripens toward spring. The fruit is orange-colored, and said by parties having tasted it to be of fair quality.

We have learned of no other trees fruiting in southern California, although, as stated in the report referred to, there are many trees growing now chiefly planted as ornament and treated as such.

ARIZONA.

In the gardens of Yuma the date palm can be seen, but the trees are still too young to bear. From Phoenix, Salt River Valley, Mr. L. Fowler reports as follows:

There are in Salt River Valley a number of date palms grown from the seed of the date of commerce. The oldest tree (probably a staminate) is fourteen years old

and has never fruited. At the Calistoga ranch, a few miles from Phoenix, there are two trees seven years old, one of which this year produced three bunches weighing together 20 pounds. The date itself is the size of an ordinary plum, yellow, and egg-shaped.

The samples sent me were unfortunately picked too early (September 20), and has consequently shriveled up badly. They showed, however, presence of plenty of sugar, and the seed was well developed, proving that they had been well fertilized. If left on the tree they would probably have been fully ripe at the end of October. This would indeed be a very favorable showing, and justify extensive experimenting.*

ALLIGATOR-PEAR.

(*Persea gratissima*.)

This tree produces the "Agua cate" of the Mexicans. It is a stately evergreen tree, and highly ornamental. Although a native of truly tropical climes—the shores of the Gulf of Mexico and the Antilles—this beautiful tree can withstand considerable cold, and with a slight protection in its first growth, has already proved hardy in many places. We have found the tree even in as high a latitude as Marysville, Yuba County. Two specimens are growing on the experimental grounds in Berkeley, and with very slight protection have survived 22° F. In Los Angeles and San Diego gardens the tree is frequently found. The only successful case of fruiting known to us is at Monticello, near Santa Barbara. The tree is growing on the grounds of Mrs. Flora Sawyer, in a well-protected place, where a number of exotic palms also flourish. It is now just fourteen years old from the seed, which was brought from Mexico and planted by the owner, Mr. Silas Bond. It has always been well cared for, and has attained a height of about 25 feet. The shape of the crown is oval. This tree has produced fruit for three years in succession, and at the time of our visit, in September, it was just beginning to ripen. Samples received at the time were quite hard, but in two or three weeks turned soft and proved very palatable, the taste resembling custard, with a flavor of beef marrow. In appearance the fruit resembles a huge California laurel berry, of an elongated egg-shape, about 3 inches long. Unfortunately the bulk of the fruit consists of a large seed.

WHITE SAPOTA.

(*Casimiroa edulis*.)

The white sapota, or, as it is called by the Spanish, "Zapote blanco," is one of the many trees that has been brought from Mexico, of which

*On October 3, 1887, I received a cluster of ripe dates from O. F. Thornton, of Phoenix, Ariz., which were grown on the ranch of Colonel Hatch, near that place. There were 211 well-developed fruits on it, and together weighed 5 pounds. The flavor was very sweet and rich, and the color a chrome-yellow with a tinge of brown. A staminate tree stood near the one which bore this fruit, and the seeds were perfect. As my informant said there were three bunches of fruit on the tree, I am quite sure the above-mentioned trees, and these, are identical. (H. E. VAN DEMAN.)

country it is a native. Mr. H. C. Ford, president of the Santa Barbara Horticultural Society, was the first to call public attention to this tree in an article written ten years ago for the California Horticulturist. In his company the writer visited two trees of this species growing in some abandoned lots formerly the property of the Old Mission of Santa Barbara. As near as can be learned, one of the trees is eighty years old. Another, probably thirty years old, is at least 25 feet high, and has a trunk 25 inches in diameter. The trees are spreading in growth, the leaves are dark and glossy, the trunk is of an ashen-gray color, and with numerous warty excrescences. Though they are entirely neglected, they ripen fruit every year in March and April. Mr. Ford describes this fruit as of roundish form, about an inch in diameter, with a juicy pulp of a pleasant subacid flavor. At the time of my visit, in September, the trees were loaded with greenish-yellow flowers, exhaling a pleasant odor. The white sapota is apparently quite hardy in this locality.

MELON SHRUB.

(*Solanum Guatemalense*.)

This is a small half-herbaceous shrub, which was brought to California from the table-land of Guatemala by the late Mr. Grelek, of Los Angeles. The fruit is yellow, splashed with violet, somewhat of the shape of the egg plant, but is seedier, and is readily propagated from cuttings. Plants grown at Berkeley have not succeeded well. At Los Angeles we saw thriving plants at Mr. Grelek's place several years ago, but from all indications they ripen rather late, and require a more tropical summer to reach perfection. Few persons seem to like their flavor, which is something like a tomato and melon mixed. Fruits were sold in Santa Barbara market this fall.

GRANADILLA OR EDIBLE PASSION-FLOWER.

(*Passiflora edulis*.)

There exist in Mexico several species of *Passiflora*, bearing edible fruit, deserving trial in California. Among those tried already the *Passiflora edulis* is best known, having been planted in various parts of the State. The flower of this species is of medium size, whitish, with a bluish tint. It blooms and bears almost the year round, and is a climber of strong growth. The fruit is the size of a small hen's egg, of a light purple, and when ripe has an acid cooling flavor. From it a good jelly may be prepared. In Santa Barbara we have seen this climber more frequently than elsewhere.

COFFEE.

(*Coffea Arabica*.)

It deserves mentioning that there has been several attempts made in California to cultivate coffee. So far the only promising experiment

was made by a Mr. Morrison, within the city of San Diego. The writer saw trees there three years ago, and obtained specimens for the New Orleans Exposition. Previous to the growing of these trees Mr. Morrison had a tree which matured fruit, but which he claims was removed from his place during his absence. The rapid building up of the city of San Diego made an end of this interesting experiment.

MELON TREE.

(*Carica papaya.*)

The following is an extract from the writer's report on economic plants and trees cultivated at Berkeley :

Mention of this tree has been made several times in previous reports, but we have never been able to report that a favorable location had been found for it. Last year we received a communication in regard to it from Mrs. W. W. Whitney, of San Diego, to whom a single specimen had been sent the year before, and this season, while traveling in the interest of the State Horticultural Commission, I had an opportunity to examine it. The Whitney residence stands on an elevation on the sloping hills above the Sweetwater River, some 4 miles from National City, San Diego County, overlooking the bay. Close to the house, and partly sheltered from the west winds, stands the specimen of the *Carica*, which when sent from here (Berkeley) in the spring of 1884 was only about 3 feet high. It is now a fine tree, over 12 feet high and 24 inches in circumference at the base. It is almost constantly full of flowers, and sets fruits all along the stem, some of these having reached 5 or 6 inches in size. I was rather surprised to see the fruit of such a size, as I thought the *Carica* to be dioecious, but it seems after all, that at least some trees contain both kinds of flowers. The *Carica* seems perfectly at home in this location, its luxuriance showing itself in every respect, the leaves reaching the size of more than 24 inches in diameter. The experiment is very promising, and I hope to see it repeated. The tree, aside from its curious economical properties (see the report of the California Hort. Com. of 1887), is highly ornamental. In appearance it is a combination of the aspects of a palm and fig tree, having the single straight trunk of the first, with the peculiar swelling at the base and the leaf of the latter. This is so striking, that it has received the generic name *Carica*, this being the specific name of the fig.

SEMI-TROPICAL FRUITS.

THE OLIVE.

(*Olea Europea.*)

The olive, with the date and other semi-tropical fruits, was early introduced into California by the mission fathers. It is found to-day as a remnant from the Old Mission garden, but owing to neglect the trees are generally not doing well in these places, particularly on account of the presence of a species of black-scale (*Secanium olea*), which appears to be a native of the State. The first attempt at making olive culture a matter of real interest does not date back much further than 1872. The person with whose name olive culture is justly associated is Mr. Elwood Cooper, of Santa Barbara. In February, 1872, he set out his first trees,

In 1876 he produced his first oil. His plantation now consists of about 80 acres. The plantation is located about a mile from the sea, 12 miles north of Santa Barbara, the climate being very mild, and during the summer subject to heavy fogs from the ocean.

When reaching a certain age the trees have alternate years of heavy and light crops. Mr. Cooper has tried the experiment of planting out trees on successive years, hoping thereby to have a part of his plantation heavily laden each harvest. The experiment was not a success. For a year or two some difference in the bearing will exist, but after a while the one condition, light or heavy yield, would be general.*

A partial remedy for this habit might be had in a suitable system of pruning, but Mr. Cooper has not found profitable any system he has tried.

Several other large plantations have been set out in Santa Barbara County, one in Santa Inaz Valley being especially promising.

In San Diego County the Kimball Brothers, of National City, were among the first to plant the olive on the mesa lands near the bay of San Diego. The rain-fall there being very scant, some irrigation has been necessary. The olive ripens there in October and November, and the yield is early and good; young trees bearing a few gallons of berries at the age of four years, and some trees at six years yielding as high as 30 gallons.

Mr. F. A. Kimball built last season a press, and a fair quality of oil was made, which has been marketed this year.

In the El Cajon Valley Mr. Levi Chase has a very fine orchard, bearing well.

About the thriving settlement of Pomona, in Los Angeles County, a number of olive trees have been planted. The Rev. Mr. Loop has a number of large trees, which at the age of ten years averaged 35 gallons apiece. Mr. White, of the same place, planted several acres of olives. They commenced bearing at about five years old, and increased rapidly. In Pomona are also some of the largest trees in the State, some of them being nearly 2 feet in diameter near the ground. Mr. White has a number of varieties on trial, but so far the Mission and Picholine are the only ones tried. Of the Mission variety there are here evidently two kinds, according to Mr. Loop, one ripening very much earlier than the other, the first ripening being small and the late ripening large. At San Fernandino Mission, in San Fernandino Valley, the old trees, nearly seventy-five years old, were cut back, and are now fully rejuvenated and bearing heavy crops. In other portions of Los Angeles County there are trees planted in many places. The largest orchard is that of Mr. C. J. Hopkins at Pasadena. They consist of Picholine and Mission, and the trees are five to six years old. At San

*In my opinion the cause is from climatic and other conditions, favorable to a good crop one year and a consequent depletion of vitality and light crop the next. This often occurs in other fruits. (H. E. VAN DEMAN).

Bernardino we find olive trees bearing in the gardens of the town. At Riverside, at the opposite side of the valley, the olive has grown to large size, but the complaint is made that the trees are not so prolific. The cause is undoubtedly too much or too little irrigation. We have seen on the grounds of Mr. H. Bliss young trees seven years old loaded with fruit, producing probably 150 pounds of olives.

INTERIOR CENTRAL REGION.*

Some trees have been planted in Fresno county, but they are yet too young to give a record. The only trees which have come under our observation are grown on the Fresno Vineyard Company's property, east of town. The trees looked bright and healthy, were in their fifth year, and have set some fruit. The soil here is a red-colored loam ; the trees are irrigated.

About Tulare City olive trees are on record as having borne, the exact yield of which I have been unable to learn. There is no reason why they should not succeed there, unless from the water rising too near the surface, caused by too copious irrigation.

In Stockton, San Joaquin County, the olive bears well, although the heavy adobe land in the immediate vicinity can not be considered adapted to its best development.

CENTRAL COAST COUNTIES.

San Luis Obispo, Monterey, and Santa Cruz counties have all proved more or less adapted to the growth of the olive with the exception of the effects of the black-scale in the moist parts of these counties. In the interior part of the first-named county large orchards are being planted this season.

CENTRAL BAY COUNTIES.

In Berkeley, Alameda County, at the University, there are growing two trees planted in 1872. At first they were totally neglected, remaining in consequence but barely alive for the first two years ; but when cultivated grew rapidly and produced at eight years 50 pounds of olives ; at ten years their yield was 100 pounds each ; at twelve years the yield was 225 pounds each, the crop of alternate years being quite small. Still the location must not be regarded as an altogether favorable one.

Mission San José.—At the old mission grounds, in Santa Clara County, now the property of Mr. Juan Gallegos, a number of old large trees are growing, planted about one hundred years ago by the mission fathers. According to Mr. Gallegos these trees were perfectly free from black-scale until about nine years ago, when he thinks it was in-

* From my own observations and numerous reports I have concluded that the foothill regions of the interior mountain ranges of California are better adapted to the growth of the olive than any other. The scale insects do not flourish there, and the soil and climate are peculiarly suitable to the slow growth of the tree and the production of the fruit. (H. E. VAN DEMAN.)

roduced with some orange trees. Before the advent of the scale the trees did exceedingly well. By severe measures, cutting back, etc., Mr. Gallegos has managed to bring them back to productiveness. The soil is mostly of a decidedly heavy character, a black adobe in many instances.

In many portions of the county young olives are being planted. Irrigation is not practiced.

In Santa Clara County exists the largest olive orchard in the central portion of the State, on the Quito ranch, 5 miles from Los Gatos.* The oldest trees on the place are twenty years old, but the majority of the trees, some 3,000, are only eleven years old, half of which were transplanted, being too close together. The trees were topped back severely and have all done well, and in two years commenced bearing some. In 1884 the yield of 1,000 trees which had not been removed or pruned severely amounted to 21 tons of olives, part of which was made into pickles and part into oil. In 1885 the yield was very light, and also in 1886. This season it promises to be good, but not as good as was expected last spring. The soil where the orchard stands is a gravelly loam and the land level; no irrigation for young trees has been practiced. Olives are found in various portions of the valley doing well without irrigation.

NAPA COUNTY.

At Saint Helena we have seen several trees of the Mission variety growing on the farm of Mr. Llewelling. The oldest trees were planted ten years ago, and began bearing, five years after, alternately light and heavy crops; received no irrigation, and are about 15 feet high and 8 inches diameter.

At Oak Knoll, the property of D. Melone, 5 miles from Napa City, we have seen specimens of olives bearing for some years.

A most interesting experiment from this section deserves especial mention. In November, 1884, Mr. A. Flamant, of Napa, set out in the hills west of the town several thousand rooted cuttings of the Picholine variety. Holes about a foot deep were dug, and in many instances the little trees were planted on the rocky soil, and earth enough to cover the roots had to be taken from elsewhere. During the summer hoeing was done sufficient to prevent baking of the ground, but no irrigation was practiced. In the most exposed places probably 10 per cent. died, but were replaced the next year. In the summer of 1887 most of the trees were in good condition, and having reached a height of 6 feet during three seasons' growth. Certainly a very encouraging showing, considering the quality of the soil.

The olive has succeeded well in the county of Sonoma in a number of different locations, the oldest and best kept orchard being that of Mr. George Hooper, near Glen Ellen, who this year obtained the prize for the best oil exhibited at the Mechanics' Fair in San Francisco.

* Very recently I visited this orchard, and found the older trees bearing a medium crop. The owner, Mr. E. E. Goodrich, had built a press and was making oil of very good quality. (H. E. VAN DEMAN.)

NORTHERN INTERIOR.

From Lake County our material for drawing conclusions as to the adaptability of the olive is rather scant, but the instance on record seems conclusive in its favor. In Solano County, near Winters, on Putah Creek, exist probably the largest trees for their age in the State. They were planted twenty-five years ago by Mr. John R. Wolfskill, and many of them measure over 6 feet in circumference. The trees have borne heavily every other year for several years past, though for some reason the crop the last two years has been light. In Pleasant and Yuba valleys there are young olive trees in different places, all doing well. In Yola County, at Woodland, the olive is met with, but yet too young to judge its yield. In the city of Sacramento the olive bears well, but is more healthy on the plains near Florin, where Mr. S. Lea has a paying grove.

About Marysville, in Yuba County, the olive does well and bears abundantly on the sediment lands, as well as in the adjoining county of Sutter. Butte County has many large trees. Mr. George Wollet has some trees twenty-three years old which are 30 feet high and fully 15 inches through at the base. From eight of these trees, two years ago, were made 64 pint bottles of oil, besides giving 2,000 pounds of berries for pickles. At Chico, Gen. Bidwell has several large trees equally as fine, planted eighteen years. They have been bearing heavily at least every other year since the sixth year from setting. Colusa County, as well as Tehama, has young olive trees bearing.

FOOT-HILL REGION.

The following is an extract from the writer's report to the State Board of Horticulture:

Placer County, Penryn.—The oldest tree about Penryn is a tree growing on Orange Hill, the property of W. R. Strong & Co. The tree was planted six years ago, then probably five years old, but very small, and although grown without care, having received no water (except from seepage from neighboring trees which have been irrigated), is a robust healthy-looking tree about 15 feet high, with a crown diameter of about 10 feet, and 8 inches through at the trunk. The tree has borne for a number of years, and last season produced somewhere near 150 pounds. This season it is bearing considerably. Scattered through the orchard are a number of olive trees of various sizes. The soil is a red-colored so-called rotten granite (Syenite). These latter trees are irrigated, with the rest of the orchard, and some few are in bearing, having been planted about five years.

P. W. Butler has a large number of olives, both of Picholine and broad-leaved Mission, planted along avenues running through the place, which, like all the country, consists of rolling hills, with a similar soil to that mentioned above. The trees were planted five years ago, then small trees, and have received liberal irrigation. They are about 12 to 15 feet high, and commenced bearing last year. The Picholines are full of fruit this year, which was ripe some time ago, much having dropped off; the Missions are not fully ripe now (middle of December). The fruit had not been utilized before this season.

Newcastle.—Mr. Charles Gould, below town, has three fine olive trees about ten years old, which have been bearing for a number of years. The trees are 8 inches

through at the base, with large crowns. The trees (Mission variety) were loaded last season, but the crop is very light this year, though the fruit is of large size. In the town of Newcastle is found an olive tree here and there. Dr. Frey has a tree in his yard doing well, with the exception of the fruit being infested with the *Diaspinous* scale referred to before. The soil is similar to that about Penryn.

Auburn.—In this neighborhood are several good-sized olive orchards, the oldest of these being that of Mr. L. A. Gould, some 3 miles from town. The majority of the trees are the so-called Picholine, which evidently here are five weeks earlier than the Mission. The oldest trees are about seven years, and are bearing quite full, one tree producing 70 pounds; their average height is about 12 feet; the habit very dense. Some oil was made from the Picholine this year, but is not clarified yet.

Beside the Mission varieties and these Mr. Gould has, are two other varieties of olives, one considerably smaller than the ordinary broad-leaved Mission, but of the same shape. Also a variety obtained from Mr. Rock, of San José, called Oblonga, of a peculiar almond-like shape. Although a very small tree, it is loaded with fruit, ripening a couple of weeks before the Mission olive here.

Irrigation has been practiced to some extent by Mr. Gould. The soil is of slaty formation, and the trees seem to thrive equally well on shallowest as on deepest soil. No signs at present of the black scale.

Mr. F. Closs, a mile or two from Auburn, has quite an orchard chiefly of Picholine; the soil is similar to that of Mr. Gould's and the trees are doing well.

Dr. Agard: About 25 acres in all have been set out in olives by this gentleman of both Mission and Picholine. The oldest trees were planted two years ago (rooted trees), and are about 5 feet high, are branched low, with only about 1 foot of trunk. In spite of the little irrigation these trees have received (10 gallons apiece during the first summer, 15 gallons this summer) the growth has been uniformly good. Dr. Agard reports, however, a much greater loss of Mission trees than of Picholines.

El Dorado.—The climate and soil of this county being very similar to Placer, we have no doubt that a great deal of land of the county is well adapted to the olive. We have learned of one gentleman undertaking the culture with success without irrigation, but have not been able to ascertain anything definite about it. About Coloma there are several trees scattered which have commenced to bear.

There is now growing in this State a large number of varieties of olives, imported by enterprising citizens, nurserymen, and others. France, Spain, and Italy are represented in these varieties, of which so few have yet fruited that correct opinions can not at present be formed on any but two.

The Mission olive—There seems to be really several kinds. Some claim to distinguish six varieties as belonging to the family of oval-shaped olives, of which the Cornicabra in Spain is the type, though M. Tablada, the well-known authority on olives, contends that the exact counterpart of the Mission olive is not to be found in Spain, and it is therefore likely that it was originally raised from seed brought by the fathers from Mexico. The same authority pronounced our Mission olive a superior one for oil. The Cornicabra class is considered a hardy but late ripening family of olives. Its latter character here is somewhat of an objection in the cooler coast climate. For this reason experiments with early-ripening varieties, as the Nevadillo Blanco, are of great interest. A well-grown Mission olive weighs one-sixth of an ounce, is of an oval shape, and when fully ripe is of a purplish-black color.* The pit is of a

* See colored plate in my annual report for 1887. (H. E. VAN DEMAN.)

comparatively small size. Well-made oil from this variety is of superior quality; indeed, one proof of this is the fact that at the World's Exposition in New Orleans Mr. Elwood Cooper's Mission olive-oil was awarded the first premium.

The Picholine.—The late B. B. Reading, esq., a far-sighted gentleman of means, and one who had the greatest faith in olive culture, imported directly from France a number of varieties of olives, which were planted on his ranch near Sacramento. Of these, it appears that all but the Picholine died. Unlike the Mission, this variety readily propagates from cuttings, and thus soon became generally distributed. Whether or not Mr. Reading was aware of the character of this olive we do not know, but after his death it was propagated supposing it to be a large pickling variety similar to the Spanish Queen, but when the tree first fruited it proved to be a small oval olive weighing about one-sixteenth of an ounce. Whether this is the true Picholine we are not qualified to decide, since no adequate description is at hand. Its chief merits with us are, compact, vigorous, and hardy growth, ripening six weeks earlier in a cool climate than the Mission. Its small size is somewhat compensated for by the ease with which it may be stripped from the branches.

PROPAGATION.

In this State it has generally been done by cuttings and layers. As regards the Mission olive, the surest results are obtained from layers, though in southern California the preferred way has been by large cuttings, as described below:

The common and preferred method is to plant the cuttings taken from the trees of sound wood from three-quarters of an inch to an inch and a half in diameter, and from 14 to 16 inches long. These cuttings should be taken from the tree during the months of December and January, neatly trimmed without bruising, and carefully trenched in loose sandy soil; a shady place is preferred. They should be planted in permanent sites from February 20 to March 20, depending upon the season. The ground should be well prepared, and sufficiently dry so that there is no mud, and the weather should be warm. In Santa Barbara, near the coast, no irrigation is necessary; but very frequent stirring of the top soil with a hoe or iron rake for a considerable distance around the cuttings is necessary during the spring and summer. About three-fourths of all that are well planted will grow. My plan is to set them 20 feet apart each way, and place them in the ground butt end down at an angle of about forty-five degrees, the top to the north, and barely cover. Mark the place with a stake. By planting them obliquely the bottom end will be from 10 inches to a foot below the surface.

This mode of propagation, especially in a changeable climate, is liable to several objections. One is that the large cuttings often remain dormant for several years, thus causing an uneven stand. By first rooting the cuttings in nursery rows this of course is avoided, but never will so fine a root system and one almost equal to that from seedling plants be developed, as by starting the trees from small *herbaceous* cuttings.

For at least the cooler parts of the State we do not hesitate in recommending this method: Take from young growing trees the top when neither very soft nor perfectly hard, having three to four sets of leaves, and cut with a sharp knife to lower joint. Put in a little frame with sand. In the course of three or four months the little cut-

tings will have rooted, and should then be potted in small pots, where they should remain until well rooted. In a few months more they will be found ready to set out. When very warm weather prevails a thin mulching around the little tree may be advisable, but when a moderate temperature prevails a few waterings in a month will be all that is necessary, and even this only in unfavorable springs. It should be added that nothing is gained by setting out the trees before the soil is warm, as they will not grow. The trees referred to previously as planted in Santa Cruz Mountain were propagated in this manner, and have received no irrigation since setting out. Trees raised from such small cuttings resemble closely young seedlings, and form a beautiful root system.

To get cuttings from large truncheons, such as are imported from Spain and other countries, proceed in the following manner: Cut the truncheons in pieces about 18 inches long, split those pieces in two, put the halves so made into the ground horizontally with the bark side up, covering with soil 4 to 5 inches deep. Let such bed be in a warm well-drained place, kept moderately moist. In a few months a large number of young shoots will break through the ground. When of suitable size and hardness, as before described, take the cuttings and treat in the manner previously mentioned.

The raising of olives from seeds has not been practiced to any extent in this State, principally because the Mission, the chief one, has a very small proportion of good kernels. The Picholine, so easily propagated from small cuttings, affords a convenient grafting stock. New varieties have been budded in the ordinary way on the Picholine by our enterprising nurserymen, but it is evident from the number of failures, that some important points in the work have been omitted. I have lately learned from Mr. White, of Pomona, that he has successfully grafted the Picholine on Mission stock by means of common cleft grafting, using quite small grafts. The work was performed in April, out of doors, without any special care other than that used by grafting other trees. We refer to this because we know of no other instance where outdoor grafts have succeeded. Grafting on young roots under glass has been practiced by nurserymen to some extent.

GENERAL CONCLUSIONS.

We have seen that the olive flourishes over a large area of the State, and perhaps it may be safe to say that no other fruit-tree is destined to be cultivated throughout such a great extent of this country. Innumerable hills and mountain-slopes skirting our coast valleys, too dry to support any other tree without irrigation, have in the olive a tree especially suited to them. The climate of these hills is nearly always warm, the frosts come late and disappear early in the spring, their nature being such as to provide the drainage that is one of the essential conditions for the healthy growth of the olive.

In other regions, in the richer valleys either of the warmer or cooler sections of the State, there is no doubt that, suitable kinds being selected for each, all varieties may here find a home. Here as elsewhere the usual questions of soil, climate, diseases, and insect enemies must be considered, the last named not being least, particularly the *Lecanium olea*, before mentioned, seemingly a native of the State. This scale will

live, and proves considerable of a drawback in all places near the sea coast, and will thrive even as far as 50 miles from it. As a general thing it becomes scarcer as we leave the coast, but not until we enter the dry climate of the interior valleys can it be defied altogether. Thus we find hardly a trace of it in parts of San Bernardino County and on the foot-hills of Placer County, where the Olive flourishes and bears remarkably well.

If this immunity from the black-scale, which in California has proved to be one of the greatest drawbacks to olive culture, is not counterbalanced by other evils, such as drying winds blowing at the time of blooming, it would seem plain that the olive grower might better leave entirely the coast regions and its influences. I expressed a similar doubt on the question a few years ago in an article recently republished and I believe now, that there are regions less subject to the north winds, and which probably will prove better suited to the growth of the olive than any other portion; we refer to the foot-hills of the Sierra Nevada Mountains at an elevation from a few hundred to two thousand feet. It seems, however, that even there we can not escape the attacks of all kinds of insects; for to my surprise I found a species of diaspinous scale infesting leaves and fruit of the olive at Newcastle, Placer County. This scale proved to be *Aspidiotus nerii*, the oleander scale, which infests the latter tree in the driest part of the State. This pest, however, could be easily guarded against.

ARIZONA.

As in all other fruits, Arizona has still but comparatively short experience to record in olive culture.

At Yuma depot, there are several olive trees growing which show signs of fruit this year. These trees are quite old, perhaps twelve years, having been transplanted from the barrack grounds three or four years ago.

Near Phoenix, Salt River Valley, the olive has only been planted two years; but the tree there, as everywhere else in Arizona, is bright and clean.

At Florence, 60 miles from Phoenix, at the gardens of Colonel Ruggles, the olive is reported as having fruited well for two seasons.

THE FIG.

(*Ficus Carica*.)

The planting of the fig began with the missions, and, like the olive, we find it still around every mission. There are few fruits ever brought to this State that are adapted to larger territory here than is the fig. From San Diego to Shasta, in the interior valleys as well as on the coast and on the foot-hills of the Sierras, it is found; and if some very exposed locations very near the sea be excepted plenty of fruit can be matured

everywhere. In the more favored and hotter valleys, certain varieties produce fruit from June to November.

The soil that the fig requires must be moderately well drained, but otherwise it does not seem to be particular, good crops maturing on alluvial loamy soil as well as on sandy soil, while the granite soils of the foot-hills in Placer County seem also well adapted to its growth; but all soils must contain moisture enough to enable the tree to hold its foliage until late in the season, otherwise the fruit would fall prematurely. We lay stress on this, because writers in this State have more than once maintained that the fig will grow on drier land than will any other fruit. On dry land it may live and grow, but the fruit will fail to mature.

CLIMATE AND MOISTURE.

It has been stated that the fig will flourish over a great part of the State; still the interior valleys, far removed from the sea-fogs, are better adapted to fig-growing than are the coast regions, and the future will doubtless see large areas of our rich interior valley lands devoted to fig culture. Compared with the olive, it might be properly said that the fig demands the deep moist soil of the valleys, while the olive will grow on our hills.*

Probably there is no tree (the date excepted), that will stand the hot winds of the interior valleys better than the fig, provided always that the moisture in the ground will hold out. Such winds as will burn the fruit on other trees, will merely hasten the maturity of the fig.

DANGER FROM FROST.

It is true that on very rich damp lands, where an unnatural sappy growth is kept up until late in the season, the fig, when young, is subject to being bitten back by frost; likewise in exposed places sometimes it may be caught by spring frosts and injured severely. Proper irrigation will regulate this, and in moist lands early cultivation should be withheld, thus preventing the rise of the moisture in the soil. As the trees gain age they are in little danger from this cause, such frosts being severe only at the ground. Under ordinary circumstances the fig will stand 18° F., and when perfectly dormant even as low as 12° F.

ADAPTATION.

Although the complete adaptation to all parts of the State is proven by the trees scattered everywhere, yet not many large plantations in regular orchard form have been attempted until late years. The magnificent cool shade produced by the large leaves of the fig has made it famous from the most ancient times, and in this State is planted largely as a shade tree around houses and in the streets of all the interior towns. It may not be out of place, for the sake of greater accuracy, to call attention to some of the large trees in various parts of the

* In the rich valley about Fresno and Tulare I saw the fig growing to perfection. The best possible conditions there exist for the growth of the tree, and the production and curing of the fruit. (H. E. VAN DEMAN.)

State. In the foot-hills of Shasta County, between Ball's Ferry and Shingletown, there is a tree about twenty-five years old over 8 feet in circumference, with a crown diameter of 65 feet. Its yield of green fruit is variously estimated from 1,800 to 2,000 pounds. At Clear Valley Springs, Calaveras County, there are a number of fig trees, owned by Mr. Wildermath, equally large and productive. On the ranch of Chico, property of General J. Bidwell, very large fig trees are found, one of them being a great curiosity. This was planted in 1856, a small poor specimen, and not receiving any special attention; but after some years it grew rapidly, dividing at the base. Several of these stems have now a diameter of over 2 feet. The tree being very low, the branches bent to the ground and the tips took root. This tree, with its numerous branches, covers a circle of 75 feet in diameter. The soil is a rich sandy loam. On the old Hock farm, 9 miles from Yuba City, on the Yuba River, the home of General Sutter, are perhaps found the largest number of old fig trees in California. The largest are more than 7 feet in circumference, but their growth is restricted by their having been planted too close together—only 20 feet apart. These trees were planted in 1855, and bear perfectly full every year.

In Pleasant Valley, Solano County, Mr. Thurber has a magnificent avenue of fig trees which are fully the size of those above mentioned. These were grown entirely without irrigation however, on moist, rich, bottom land. About Stockton, Sacramento, and San José, large trees are met with everywhere.

In the southern portion of the State we meet likewise with large old trees near all old settlements. A very large tree is found near the Old Mission in San Diego.

VARIETIES.

It has been stated before, that few large orchards of more than four years' growth exist in this State. Formerly the fruit was thought by many to be unprofitable, and only the sections growing early figs received a paying figure for their fruit; the principal trouble really being that no fine drying variety had been available. For years past a number of gentlemen have been attempting to introduce for drying, the fig of commerce, commonly known as the Smyrna; more than one attempt having been made to bring the best fig from Smyrna. The trees from some of these importations must be at least five or six years old, but with the exception of trees belonging to Mr. E. H. Parker, of Penryn, Placer County, fruit on these imported Smyrnas has not yet appeared; no doubt this is due solely to the age of the trees. Mr. Parker pronounces his fruit of a superior quality. The foot-hills of Placer County are known for their precocity in fruit bearing.

Besides the importations made several years ago a new shipment will arrive this year, being imported by an enterprising firm in Fresno County. Now that caprification, or artificial fertilization, of the fig through the agency of insects has been fully investigated by the Italian Government and proved to be a myth, it is plain that we have

only to seek the right varieties for drying to make the business a success, and no doubt we have already some of these. The so-called

WHITE ADRIATIC

fig (true name supposed to be Sutasega) was first brought a number of years ago from Dalmatia to Stockton, where, according to Mr. W. W. G. West, the original trees exist, but much attention was not drawn to them before three or four years ago, when this variety of fig was extensively advertised. The fruit, when matured, is of a greenish-yellow color, almost oval in outline, pulp red and rich, seeds small. When dried it is very fine, the size only being inferior to the best imported figs. In regard to its general bearing qualities sufficient is not yet known, but it has been stated on good authority that as regards fruit it is harder than the Mission fig.

MISSION.

The common fig in California is the so-called Mission, raised either from seed by the missionary fathers or brought from Mexico. It is a large vigorous-growing tree, instances of which have been given above. The fruit is small and dark colored. It is an abundant bearer, and its fruit, when properly dried, is very good, and we understand sells quite well in the eastern markets. This fig bears considerably the third and fourth year from cuttings.

There exist in California quite a number of varieties of figs the nomenclature of which is in great confusion. The San Pedro is what has been generally called the White Smyrna, a fine eating variety, but not adapted to drying; greenish-white, white flesh, small seeds.

We will not attempt to go into a description of the different kinds introduced into this State, but will refer those interested in the subject to Dr. G. Eisen's treatise on fig culture, published by the Pacific Rural Press.

DRYING THE FIG.

At the convention held in Los Angeles in 1886 Dr. Eisen exhibited fine dried specimens of the White Adriatic fig, and in Sacramento, November, 1886, W. M. Williams, of Fresno, showed the same fig.

Dr. Eisen describes his method thus:

In drying the figs which I have exhibited here to-day I endeavored to follow the Smyrna way as much as possible. While we evidently have yet much to learn in regard to the drying, and manipulating the figs after they are dried, I still believe that we are a good way on the right track, and it will be for you to decide if my suppositions are correct. The variety exhibited at this horticultural meeting is the Adriatic, not only the best, but the only one which I have so far found suitable for drying for commercial purposes.

When the figs began to wilt and show small white seams they were cut from the trees by means of scissors or a knife, then carefully placed on trays similar to raisin trays. I believe a further great improvement would be to nail laths across the bottom of the tray in such a way that they would form longitudinal ribs on the bottom just the thickness of the lath, or about one-eighth of an inch. By placing the figs with the eye elevated on the rib the sugary contents are prevented from leaking out,

which else may happen quite frequently. The figs are now placed in the sun to dry. They were turned every day, at first separately by hand, but when partially dried were turned in the same way as we turn raisin trays. Every night they were covered over, and for this purpose it is best to have all the trays on one place and not scattered around, as is the custom with raisin trays. The figs are sufficiently dry when they show the same dryness in the morning as in the evening. This is a point of great importance. If not sufficiently dried, they will puff up and spoil, as if they were in a state of fermentation. In the evening the figs may seem to be sufficiently dried, but in the morning they will be found slightly swollen and puffed. They must then be dried more. It is, however, a great danger to overdry the figs. Such figs will get a cooked and earthy taste, which afterwards will never leave them, and which will injure them or spoil their value entirely. It took from five to twelve days to dry the figs, according to the weather. When dry they may be dumped into sweat boxes for a few days, but the better way is to dip and pack right away. Now prepare a kettle or tub with boiling water, in which put enough common unrefined rock salt, such as is used for cattle; table salt will not do. I believe the more unrefined the salt is the better. Sea-water may be preferable. The latter and the rock salt contain substances which preserve the moisture of the figs and keep them pliable. About three big handfuls of rock salt to one gallon of water is enough. When the salt is dissolved and the water is again boiling immerse the figs for two seconds; immediately afterwards thumb the figs, and work the eye of the fig downward and the stalk end upward; in fact, imitate the appearance of the imported Smyrna fig. This process is necessary. First, it distributes the thicker skin around the eye of the fig evenly, and in eating we thus get equal parts of the thicker skin and equal parts of the thinner skin. Secondly, it places the fine skin of the stalk end all on top, and when the figs are packed and pressed they present a beautiful smooth surface. I believe the dipping of the figs in *boiling* salt water may be dispensed with if the figs are sufficiently pliable without it. But it is absolutely indispensable to dip the figs in salt water, and during the thumbing of the figs the hands of the packer must be constantly moistened by salt water or the sugar will stick to the fingers and make the operation almost impossible. After having been dipped in the brine the figs taste at first exceedingly salt, all the salt being on the surface; but after a few days the salt works into the fig, and gives it a peculiar appetizing taste, counteracting the excessive sweetness, which else would be too predominant. I have examined the best Smyrna figs microscopically, and I find that the white floury substance which on old figs covers their whole surface is entirely due to uncrystallized grape sugar sweated out from the fig and to small crystals of rock salt. I believe that in Smyrna when the box is packed, and before it is pressed, the whole box is immersed in salt brine, so that the latter will fill all the pores and crevices between the figs, and thus kill any possible insect eggs and germs of fungus or bacteria deposited on the fig, which would cause them to become wormy and spoil. In opening fig boxes I have often found the sides covered with the white incrustations of salt.

The heavy pressing of the figs, which is always so strong that it causes them to burst at the stalk end, is much objected to by the consumer, as it evidently defaces the fig. But, nevertheless, this compression is absolutely necessary. It prevents insects from entering between them, and it prevents the air entering, thus drying out the fig. Observation and practice have shown this to be the case.

As my own crop this year has not been sufficient to place the same on the wholesale market, I have not pressed them as much as they otherwise should have been pressed, and my object was to keep the figs more intact.

Drying of figs in California, with the exception of before-mentioned cases, has not received much attention, principally because it was thought that we had not the true drying varieties.

The most successfully-dried figs (with the exception of those by Dr. Eisen) were prepared by Mr. Burnham, of Riverside. This is a small

fig, and according to Dr. Eisen is the White Marseilles. Mr. Burnham picks his fruit from the tree when it is wilted, and while yet green treats it to a strong sulphur bath, and then puts it in the sun to dry. When of sufficient dryness it is put into sacks to sweat, after which it is packed into small boxes.

The ordinary way of drying figs in California is very simple: Straw is spread on the ground under the trees, so that the fruit may drop without becoming soiled. It is picked up as it falls, and dried on trays in the sun. When supposed to have reached sufficient dryness it is put in heaps to sweat, after which it is packed into small drums or pressed into boxes. Compared with first-class dried fruit, these figs do not command high prices.

ARIZONA.

The fig will doubtless prove well suited to large portions of central and southern Arizona. The tree wherever planted develops rapidly.

About the gardens of Yuma the fig has been planted for some years, the tree growing rapidly. As regards their actual bearing we could get no exact statement, but persons growing them stated that they had borne well the third year. At the time of our visit (October) there were young figs forming, the second crop having ripened.

In Salt River Valley the fig is said to bear two crops regularly, and sometimes three. (This is in the case of the Mission fig.) The dry climate would make sun-drying a very easy matter.

POMEGRANATE.

(*Punica granatum.*)

This bush seems to flourish from one end of the State to the other, being met with in nearly every garden on the coast. Exposed to the raw sea-winds it does not set with fruit, and is best adapted to the warmer regions of the interior, where it is an early and abundant bearer. Although sold in our markets, it is not very much in demand except for certain classes of people. The Mexicans and south European population are the chief consumers.

The variety chiefly cultivated is a bright orange color, but there is found a large variety of them varying from almost pure white with a faint blush to dark red.* The largest collection that we have seen was growing on the grounds of Mrs. Arnerich, near Los Gatos, Santa Clara Valley; they all seemed to reach perfection on the gravelly soil here, receiving some irrigation.

In Arizona we find the pomegranate perfectly at home, being found in many gardens in various parts of the Territory.

*The darker-colored varieties, so far as I have seen, are the sourer, and make a very nice drink, like lemonade, by crushing the interior part in water. (E. H. VAN DEMAN.)

PRICKLY-PEAR, TUNA.

(Opuntia vulgaris.)

This large species of cactus is found considerably about all the missions of the State, where they were planted chiefly as a hedge plant. Originally brought from Mexico. The fruit, which is the size of a good-sized pear, is of a pleasant, subacid flavor, but owing to the care necessary to skin it to take off the minute prickles, few people except those "to the manor born" take to them. The fruit ripens in September, and can be found on all the fruit-stands in Los Angeles.

THE CAROB.

(Ceratonia siliqua.)

The following extracts are from the writer's report on Economic Plants and Trees cultivated at the Experimental Grounds at Berkeley:

"In the reports of this Department (horticultural) reference has been made to this most useful tree, and in that of the year 1884 a full discussion of its merits was made, to which we now refer the reader. During the last two years the growth of the young trees on the grounds has been very satisfactory, the oldest specimen in the garden of economic plants having grown at the rate of 3 feet a year without a particle of irrigation. The condensed reports given below are, for the most part, very satisfactory; but some of the most interesting points have been obtained during last summer, while I was traveling in the interest of the State Board of Horticulture. I am very much gratified to find at the base of the hills south of Los Gatos a number of trees in a flourishing condition. The place belongs to Mrs. Elizabeth Arnerich, a widow of a Dalmatian gentleman, who brought the seed with him from Dalmatia a number of years ago, when returning from a visit to his native country. The seed was planted the next season (1873) in boxes, and set out the following year in various places on the ranch, mostly on a red gravelly soil which during midsummer becomes dry to quite a depth. There are in all some 25 trees scattered about. Most of them have been moved once, and have, for this reason, been set back a number of years. The best trees are about 12 feet high, with a stem diameter at the ground of about 8 inches. A few of these trees commenced bearing fruit in 1885, and several of them have a number of pods on them this year (1886), although from the abundance of the blooms a good many more were expected. The trees, although not irrigated, present a striking appearance compared with other trees, such as figs, plums, etc., their glossy green indicating their superiority in resisting drought, while the other trees gave unmistakable evidence of the want of moisture in the ground.

"We thus have proof that the carob will grow with less water than any other fruit-tree, the olive tree not excepted. This demonstration

is just what we have desired, and it warrants us in recommending the tree for general trial in this State.

"It will be remembered it is by grafting and budding only that superior varieties are propagated and the tree brought into early bearing. Mrs. Arnerich had made several attempts to get grafts, but owing to poor packing had failed. She showed a sample of the variety that could be obtained from Dalmatia. The pods were larger than any I have ever seen, being fully 10 inches long.

"The case of the carob tree at James Shinn's nursery (Niles, Cal.), coming into bearing has been mentioned in the previous report. This year the tree showed a large increase in yield, although a number of pods dropped off just after setting, which was probably caused by a little too much moisture in the ground. Judging from the two instances, the outlook for successful carob-growing seems very bright."

PISTACHIO.

The *Pistacia vera*, or pistacio-nut tree, is a small tree of spreading habit of growth. The nut is known also as green almond, owing to the kernel having this (for a seed) exceptional color. They are eaten raw or roasted, while large quantities are used in candies. Our own experience, as well as the experience of others, shows this tree to be a very slow grower in this State, although thriving better in the hotter part of the State. The largest plants we have met with are at the nursery of James Shinn, of Niles, Cal., and are more of the nature of a bush than of a tree. Although several years old, they are but 6 to 8 feet high.

The pistachio should be set out permanently when it is small, as it is difficult to transplant when older, owing to the very long tap-root. To encourage growth of this tree it may be grafted on the *Pistacia terebinthus*, a tree that has proved very well adapted to the State.

LOQUAT.

(*Eriobotrya Japonica*.)

The loquat, incorrectly known in the southern States as "Japan Plum," is planted extensively in the gardens all through California, but has generally been considered as merely ornamental. In no case are we aware of its being planted as an orchard tree. It is perfectly hardy in the coast region, at least from Marin County southward, but blooming as it does during the coldest season, it is not apt to set fruit excepting in comparatively frost-free localities. To do well, it requires in general, some irrigation, the foliage and fruit thereby growing much larger. The flowers, growing in umbel-like clusters, are small, white, and inconspicuous. The fruit is elongated in shape, and when well grown 2 inches long, of a pale-yellow color. The flavor is peculiar, combining that of the tamarind and pine-apple, and is highly agreeable. A

person upon tasting it wishes there were only more of it, the seeds taking up the largest portion of the fruit. It begins to ripen in late spring, continuing for several months. The most successful yield which has come under our notice was at Mr. James Shinn's nursery, in Niles, Alameda County. Here a number of trees, now thirteen or fourteen years old, have been bearing abundantly for several years, producing from 25 to 30 pounds each every year. The fruit has found ready sale, and, as Mr. Shinn informs me, has been bought chiefly by the Chinese. There is no question but that the loquat will bear well in many portions of the State—all through the thermal belt of our coast valleys. The trees seem to be but slightly subject to the attacks of insects. In Los Angeles, Santa Barbara, and San Diego counties the loquat has fruited, and when better known will prove quite profitable. As there is much variation in the seedlings of this fruit, a variety with a small seed should be selected and propagated from by budding. The loquat does not seem particular as to the soil in which it grows.

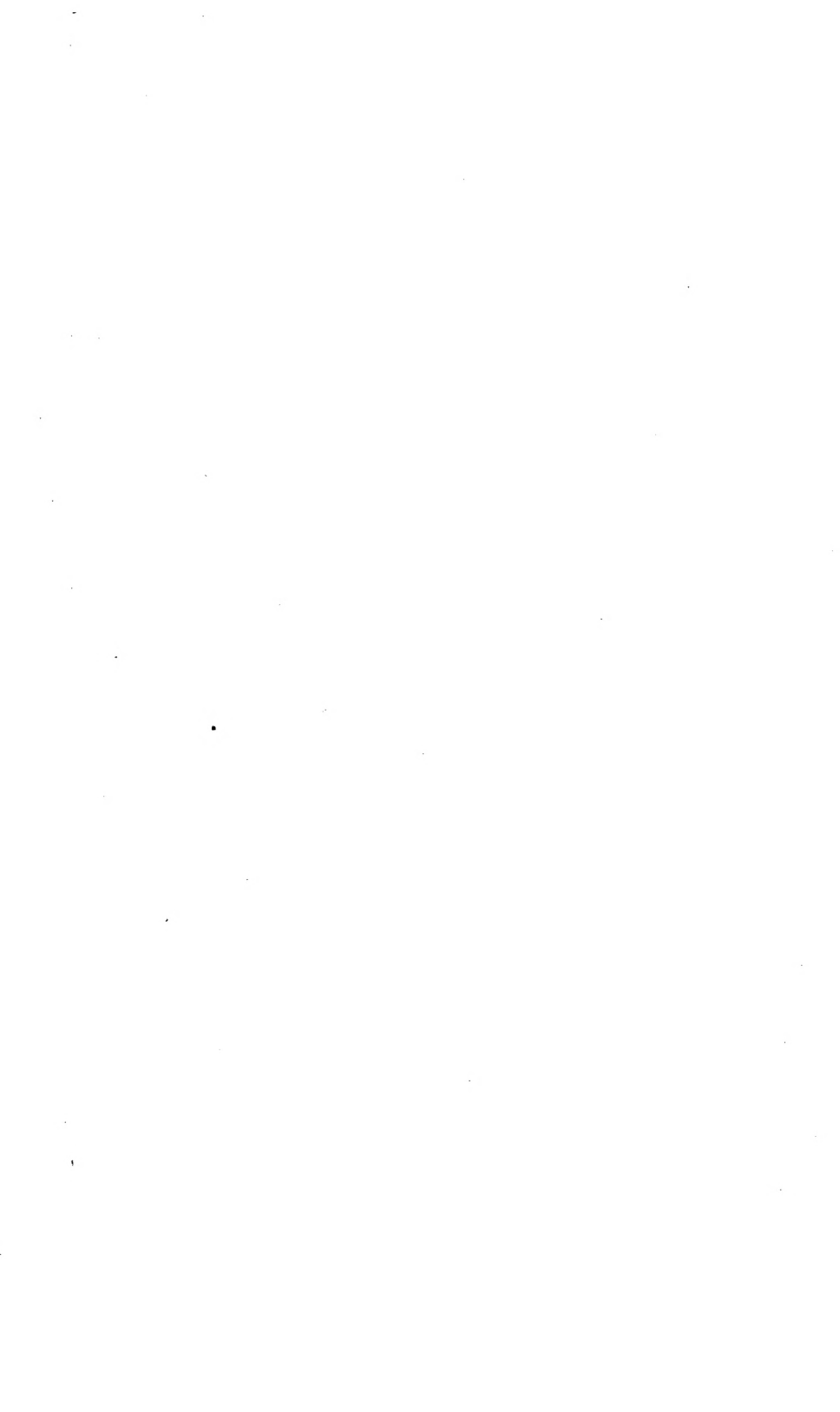
NEW MEXICO.

The only three species of fruits coming under the head of semi-tropical which have been tried in New Mexico, as far as I have been able to learn, are the olive, the fig, and the pomegranate. With other semi-tropical fruits experiments are going on, but according to my informant, Maj. W. H. H. Llewellyn, of Las Cruces, the above are the only ones of which there can be formed an opinion yet. They are all grown in the lower valleys of southwestern New Mexico.

The olive has only been tried in an experimental way. For two years it has been growing in south Doña Aña County at an elevation of 3,800 feet, and has proved hardy so far. The stock was imported from France. The trees are not irrigated.

The fig has also been growing in Doña Aña County, in the same locality as above, for the last thirty years, and is there a perfect success. The variety cultivated is the so-called Mission, and ripens in September.

As might be expected, the pomegranate has proved hardy in New Mexico, and the fruit ripens in September. The variety is the common red.



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